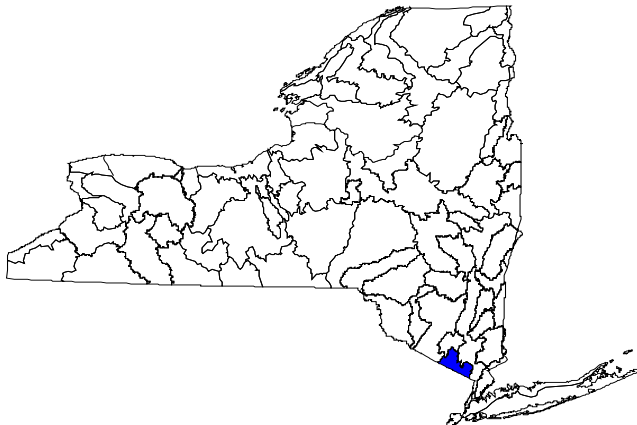


Bureau of Watershed Assessment and Management
Division of Water
NYS Department of Environmental Conservation

The Ramapo/Hackensack River Basin Waterbody Inventory and Priority Waterbodies List

Encompassing portions of
Orange and Rockland Counties



July 2008

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The Waterbody Inventory and Priority Waterbodies List

In order to fulfill certain requirements of the Federal Clean Water Act, the New York State Department of Environmental Conservation (NYSDEC) must provide regular, periodic assessments of the quality of the water resources in the state, and their ability to support specific uses. These assessments reflect monitoring and water quality information drawn from a number of programs and sources, both within and outside NYSDEC. This information has been compiled by NYSDEC Division of Water and merged into an inventory database of all waterbodies in New York State. The database is used to record current water quality information, characterize known and/or suspected water quality problems and issues, and track progress toward their resolution. This inventory of water quality information is the division's Waterbody Inventory/Priority Waterbodies List (WI/PWL).

In addition to providing a baseline assessment of water quality, the Waterbody Inventory/Priority Waterbodies List supports program management within the Division of Water in other ways. For example:

A Focus for Division Program Activities

Because of limited resources, various division programs (monitoring, compliance, restoration and protection activities, grant funding, etc) need to address those specific water quality issues – both statewide problems (e.g., stormwater, toxic/contaminated sediment) and site/waterbody-specific concerns – where program efforts will have the greatest impact.

A Consistent and Objective Inventory

WI/PWL assessments of water quality problems and issues are used in the development of program-specific priority ranking/scoring systems and efforts.

A Record of Water Quality History

Because the WI/PWL provides information for specific waterbodies, staff can easily respond to questions – from both within and outside the division (including the public) – concerning what is known about the water quality of specific rivers, lakes and watersheds.

A Measure of Progress

The WI/PWL also aids in the tracking of progress by division programs and other efforts toward improving the water resources of the state.

Comprehensive Assessment Strategy

The Waterbody Inventory/Priority Waterbodies List is a key component of the Division of Water's larger *Comprehensive Assessment Strategy*. This strategy is designed to integrate a variety of division activities into a more coordinated and comprehensive water quality program. The specific goals of the *Comprehensive Assessment Strategy* are to provide a:

- thorough (appropriate to available resources) monitoring of state waters;
- complete evaluation and consideration of all available monitoring data;
- comprehensive assessment of the quality of all waters in the state; and
- coordinated approach to improving and protecting these water resources.

Implementation of the *Comprehensive Assessment Strategy* relies on a rotating drainage basin approach. This approach focuses water quality monitoring and assessment activities on a portion of the state for a designated period of time, and then turns attention to other parts of the state. New York State's use of the rotating basin approach enables the updating of the WI/PWL in two or three of its seventeen drainage basins (about 20% of the state) each year. This schedule allows for a comprehensive reassessment of the water quality throughout the entire state over a five-year cycle (see Figure 1).

Statewide Waters Monitoring Program

Prior to the updating of the WI/PWL, the division conducts a two-year monitoring effort in the targeted drainage basins. These basin studies – conducted within the Division of Water's Statewide Waters Monitoring Program – involve a variety of sampling activities conducted by the division, other NYSDEC programs, and water quality partners outside NYSDEC.

The first year of these basin studies focuses on the review of existing water quality information and the incorporation of monitoring efforts being conducted by other basin/watershed partners. Division monitoring activities in the first year are generally limited to *biological screening*. Biological screening relies on the use of resident biological communities as indicators of water quality. The primary biological communities are fish, macroinvertebrates (aquatic insects) and algae. Of these, macroinvertebrates have proven the most appropriate for screening water quality at a large number of sites in a reasonable amount of time.

The second year of the basin studies involves more intensive chemical and biological monitoring. This includes water chemistry sampling at selected sites, sediment chemistry/toxicity sampling, multiple site surveys along specific river reaches, and other site- or problem-specific monitoring investigations.

Water Quality Assessments: Updating the WI/PWL

At the conclusion of the monitoring effort in a basin, the water quality data are evaluated to assess the ability of the waterbodies to support specific water uses (water supply, public bathing, aquatic life, secondary recreation, etc). As was the case with the monitoring effort, the evaluation and assessment of data and subsequent updating of WI/PWL information incorporates input from division/department staff and outside partners as well. WI/PWL assessment workshops are conducted for NYSDEC regional staff and watershed partners within each targeted basin, and participants are encouraged to submit assessment worksheets for waterbodies for which they have information. This information – along with Statewide Waters Monitoring Program assessment information – is compiled and distributed to participants for review and comment before the Final WI/PWL Assessment Report is issued.

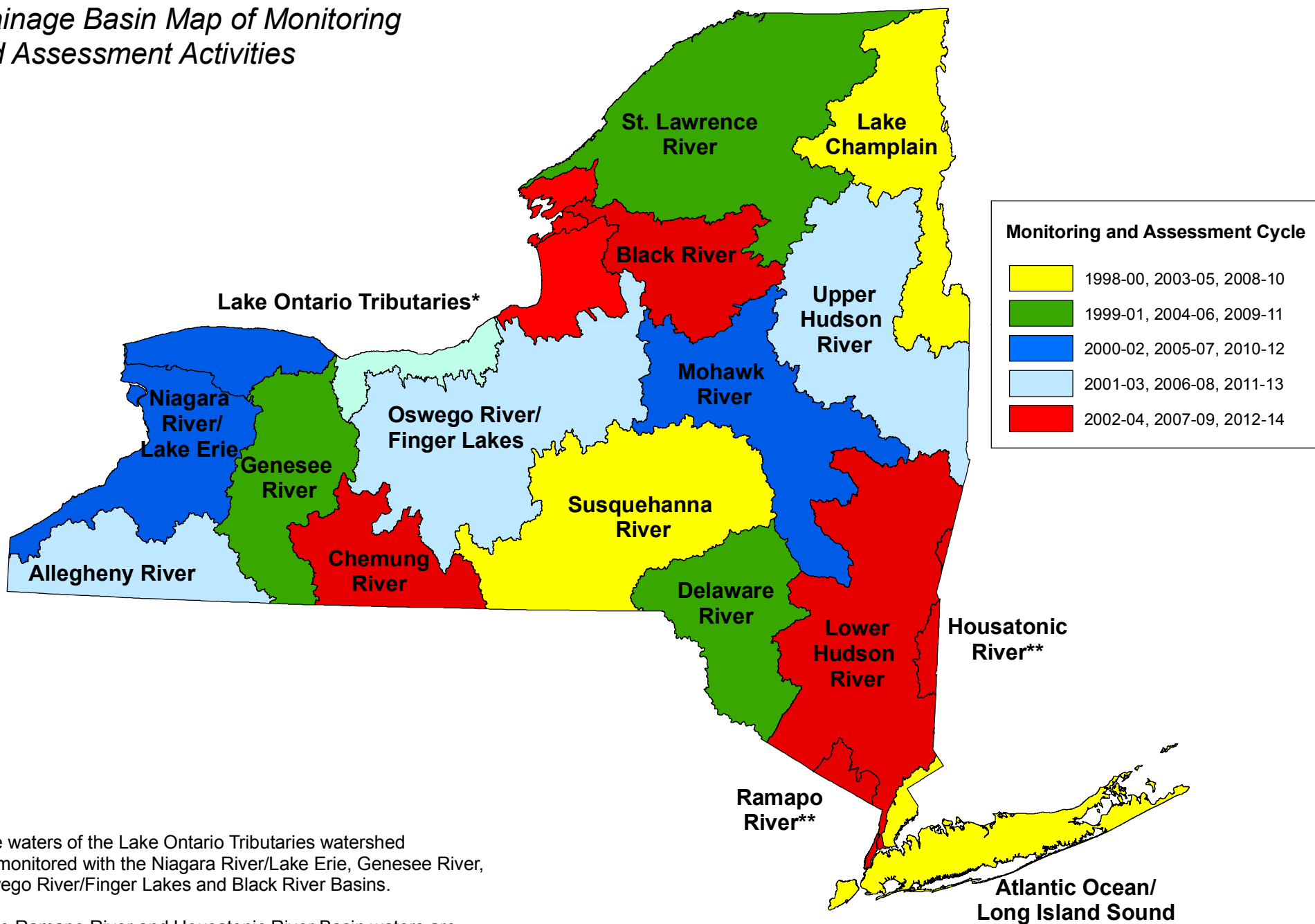
An Expanded *Waterbody Inventory*

Upon its inception in 1983 and through the mid-1990s, the Priority Waterbodies List was limited to recording information for only those waters with known or suspected water quality problems. The expansion of the database to include *all* waters in the state, including those with good and unknown water quality, is a fairly recent effort. However, while this expanded waterbodies database provides more complete water quality information, for program management purposes the division must also be able to cull a subset of "*priority*" waterbodies from the inventory of all waters on which the division should spend resources. In other words, there is a need for both a comprehensive *Waterbody Inventory* of water quality information for all waters in the state and a subset of this inventory that is limited to segments with well documented, potentially resolvable, higher priority problems and issues. This subset of the Waterbody Inventory is the *Priority Waterbodies List*.

Figure 1

Comprehensive Assessment Strategy

Drainage Basin Map of Monitoring and Assessment Activities



*The waters of the Lake Ontario Tributaries watershed are monitored with the Niagara River/Lake Erie, Genesee River, Oswego River/Finger Lakes and Black River Basins.

**The Ramapo River and Housatonic River Basin waters are monitored with the Lower Hudson River basin.

In order to achieve these multiple objectives, segments in the larger comprehensive Waterbody Inventory are segregated into one of six (6) *Water Quality Assessment Categories*. These are outlined below.

WI/PWL Waterbody Assessment Categories

Impaired Waters: These are waterbodies with well documented water quality problems that result in *precluded* or *impaired* uses (waters with *stressed* or *threatened* uses are not included in this category). This category includes *High* and *Medium Resolvability* segments where the Division considers the expenditure of additional resources to improve water quality to be worthwhile given public interest and/or the expectation that a measurable improvement can be achieved; and *Low Resolvability* segments with persistent/intractable problems on which the Division is not likely to spend any significant resources (e.g., segments affected by atmospheric deposition, etc.).

Waters with Minor Impacts: These are waterbodies where less severe water quality impacts are apparent but uses are still considered fully supported. These segments correspond to waters listed as having *stressed* uses.

Threatened Waterbodies: These are waterbodies for which uses are not restricted and no water quality problems exist but where specific land use or other changes in the surrounding watershed are known or strongly suspected of threatening water quality. Also included in this category are waterbodies where the support of a specific and/or distinctive use make the waterbody more susceptible to water quality threats.

Waterbodies with Impacts Needing Verification: These are segments that are thought to have water quality problems or impacts but for which there is not sufficient or definitive documentation. These segments require additional monitoring to determine whether uses are restricted.

Waterbodies Having No Known Impacts: These are segments where monitoring data and information indicate that there are no restrictions to overall uses, although minor impacts to component indicators (such as biological assessments) may be present.

UnAssessed Waterbodies: These are segments where there is insufficient water quality information available to assess the support of designated uses.

Taken together, *Impaired Waters, Waters with Minor Impacts* and *Threatened Waterbodies* comprise the Division of Water Priority Waterbodies List (PWL). These segments are the focus of remedial/corrective and resource protection activities by the division and its water quality partners.

***Waterbodies with Impacts Needing Verification, Waterbodies Having No Known Impacts* and *UnAssessed Waterbodies* are tracked on the comprehensive Waterbody Inventory, but are not considered to be included among waters on the Priority Waterbodies List.** For these waters, additional monitoring and assessment activities to document possible or potential future impacts, causes and sources are more appropriate than remedial/corrective action or resource protection efforts.

Maintaining a comprehensive Waterbody Inventory allows division staff to easily respond to questions – from both within and outside NYSDEC – concerning the water quality of specific rivers, lakes and watersheds. By segregating the database in the manner described above, the Division can also identify specific priorities where the coordination of limited resources can most effectively address water quality problems.

The Ramapo/Hackensack River Basin

Basin Description

The Ramapo and Hackensack River are part of the Passaic River Basin which is located primarily in northeastern New Jersey. However the northern headwaters of the basin lie within a small portion of southeastern New York State. The Hackensack River, Saddle River, Ramapo River and Wanaque River/Greenwood Lake are the primary tributary waters that make up the New York portion of the basin. The entire Passaic River Basin covers about 935 square miles before emptying into Newark Bay and then New York Harbor/Atlantic Ocean. Within New York state Passaic tributaries drain about 211 square miles in the southern Hudson River Highlands. The basin includes much of Rockland County and a small corner of Orange County.

Although the Ramapo/Hackensack River Basin is the smallest in New York State in area, it is also one of the most densely populated. The total population of the basin is 249,035 (2000), or about 1180 persons per square mile. Urban/suburban areas (New City, Spring Valley, Suffern, Nanuet) dominate the eastern (Hackensack) half of the watershed. In the western half of the basin the population is more scattered among larger tracts of forest and woodland.

There are about 320 miles of rivers and streams the basin and 80-90 lakes and ponds. Many of the ponds are too small to be individually assessed, but 35 significant* lake, pond and reservoir waterbody segments (covering 5162 acres) are included in the Ramapo/Hackensack River Basin Waterbody Inventory. The two largest tributaries – the Ramapo and Hackensack Rivers – account for 155 miles (or 47%) and 74 miles (23%) of river/stream miles in the basin, respectively. The largest lakes in the basin are Greenwood Lake (1,075 acres in New York State) and DeForest Lake (720 acres).

Water Quality Issues and Problems

Water quality impacts in the New York State portion of the Ramapo/Hackensack River Drainage Basin are primarily the result of extensive urbanization and suburban/commercial development in the eastern, Rockland County half of the drainage area. Urban/stormwater runoff is the dominant source of water quality impacts. Municipal discharges are a second source of nutrient and other pollutant loadings; not surprising given the heavy population of the basin. In areas not served by municipal wastewater facilities, failing and/or inadequate on-site septic systems are a concern. Industrial and past hazardous waste site disposal are also noted as the source of some water quality impacts in the basin.

In addition to addressing existing sources and restoring impacted waters, there is also widespread interest and support for protecting the highly valued water resources of the Ramapo/Hackensack River Basin. Of particular concern is the protection of drinking water resources. The larger tributaries in the basin – Hackensack, Ramapo and Mahwah Rivers – are Class A waters designated for use as water supplies. In addition to the water supply use of these waters in New York State, most all of the waters in the basin feed into significant water supply systems in New Jersey.

* *Significant Lakes* are lakes of 6.4 acres (0.01 square miles) or larger and are included the [New York State Lakes Gazetteer](#).

Urban/Industrial/CSO Runoff

Various recreational uses, aquatic life use support, and aesthetics in stretches of the urban/suburban waterways throughout the basin are significantly restricted by pollutants from various industrial, municipal, and commercial sources. The most significantly affected of these waterbodies are located in the highly developed New York City suburbs of Rockland County. Urban storm runoff transports a variety of pollutants and debris into the waterways. Contaminated sediments, inactive hazardous waste sites and other impacts attributed to past/historic discharges also limit waterbody uses.

Commercial Development/Suburban Sprawl

Impacts on water supply resources, aquatic life and other uses due to increasing commercial and suburban residential development is of particular concern in the Ramapo/Hackensack River Basin. Such development and the accompanying expansion of impervious surfaces results in more nonpoint runoff and increasing loadings of silt, nutrients and chlorides. Additional residential growth and accompanying wastewater impacts – be they individual on-site systems, cluster systems or smaller municipal facilities – also contribute to increased pollutant loadings.

Lake Eutrophication and Recreational Use Impacts

Eutrophication is a natural process that occurs as a lake ages and is not necessarily indicative of man-made pollution. However when human activities (e.g., shoreline erosion, urban/agricultural runoff, wastewater discharges or septic seepage) accelerate this process, it is known as cultural eutrophication. Such accelerated changes can alter plant and animal life within the lake, shoreline and surrounding watershed, and decrease the water quality and recreational value of a lake. The population growth and preponderance of small lakes in the Ramapo/Hackensack River Basin result in the frequent occurrence of such impacts on recreational uses of basin lakes.

Groundwater Resources

Although groundwater resources are not specifically tracked through the WI/PWL, they are considered *Priority Waters* nonetheless. Groundwater 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. Ground water resources are particularly at risk in the Ramapo/Hackensack River Basin where large populations – in both New York and New Jersey – rely on wells for drinking water supply. In the basin, the more significant threats to groundwater resources include urban/stormwater runoff, inactive hazardous waste sites, chemical spills, deep-well injection and failing/inadequate on-site wastewater treatment systems.

Ramapo/Hackensack River Basin Water Quality Assessment

The series of charts presented on the following pages provides an overall assessment of water quality conditions in the entire Ramapo/Hackensack River Basin. For each waterbody type (rivers/streams and lakes/reservoirs) the first chart shows the percentage of the miles/acres of waters in the basin that fall into the various water quality assessment categories. The **red** portion of the first pie indicates the percentage of waters characterized as *Not Supporting Uses*. The **purple** portion represents segments with *Minor Impacts/Threats*. Taken together, these categories of waters comprise the *Priority Waterbodies* for that waterbody type. The percentage of miles/acres for the other water quality assessment categories – waterbodies having *No Known Impacts*, *UnAssessed Waters*, and waterbodies with *Impacts Needing Verification* – are shown in **blue**, **light blue**, and **green** respectively.

The second pie chart shows the severity of the most significant use impact or restriction for waters in the two categories that comprise the Priority Waterbodies. The levels of severity are:

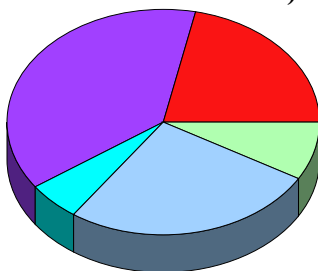
- Precluded:* waters do not support appropriate uses;
- Impaired:* waters frequently do not support appropriate uses;
- Stressed:* waters support appropriate uses, but other water quality impacts are apparent; and
- Threatened:* waters support uses and have no impacts, but activities threaten future 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 Ramapo/Hackensack River Basin. The charts reflect the percentage of miles/acres of the total waterbody area on the Priority Waterbodies List where a particular source is listed as a major contributor to the water quality impact. For each source, the color shading of the bar indicates the severity level (*Precluded, Impaired, Stressed, Threatened*) of the most significant water use impact to the waterbody.

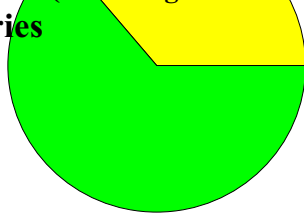
Rivers/Streams

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



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

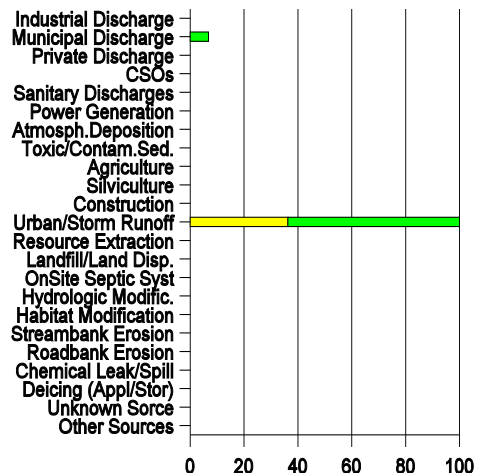
Severity of Problems
(PWL Segments Only)



- Precluded
- Impaired
- Stressed
- Threatened

Ramapo/Hackensack Basin
 Total River Miles: 320
 Total PWL Miles: 191

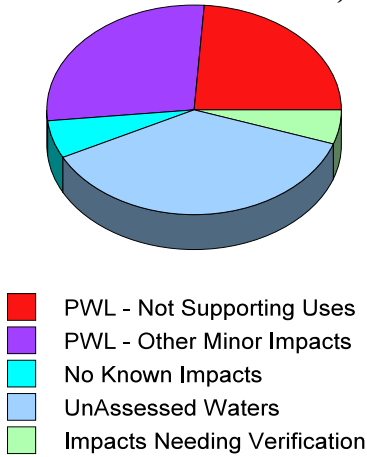
Major Sources of Impact
(PWL Segments Only)



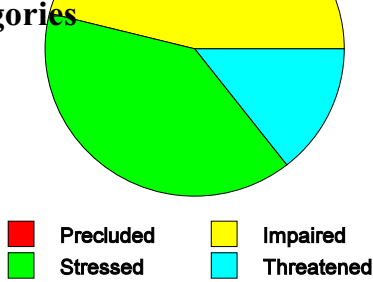
Percent of PWL Waters Affected

Lakes/Reservoirs

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

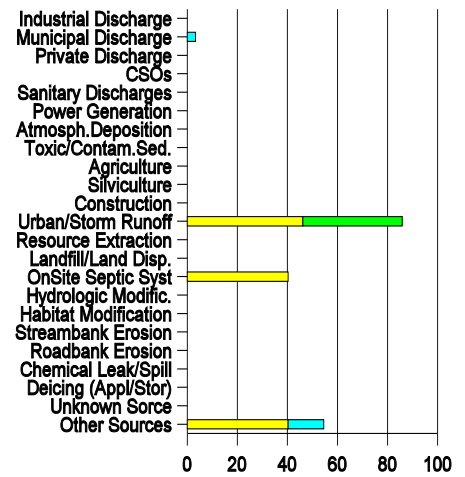


Severity of Problems (PWL Segments Only)



Ramapo/Hackensack Basin	
Total Lake Acres:	5,162
Total PWL Acres:	2,667

Major Sources of Impact (PWL Segments Only)



Percent of PWL Waters Affected

Basin Water Quality Summary

About sixty percent (60%, or 191 miles) of the 320 river miles in the Ramapo/Hackensack River Basin are included on the Priority Waterbodies List as either not supporting uses or having minor impacts or threats to water quality. Nearly two-thirds (63%) of these Priority Waterbody Listed river miles are considered *Stressed* or *Threatened* waters that fully support appropriate uses, but that have minor impacts/threats to uses. However nearly twenty-two percent (22%) of all river miles in this highly urbanized basin are *Impaired* and do not fully support appropriate uses.

Six of the 35 separate lake segments in the basin are included on the PWL as having either impaired uses or minor impacts/threats to uses. However these six impaired/impacted lakes include the three largest lake waterbodies and represent over half (52%) of the total lake acres in the basin. Two of these lakes (totaling 1,233 acres, or 24% of basin lake acres) experience water quality impacts that result in uses not being fully supported.

The most frequently cited source affecting water quality in this highly developed basin is urban/stormwater runoff. Failing and/or inadequate on-site septic systems are also noted as a significant contributing source; however this source is cited for just one waterbody (Greenwood Lake, the largest lake in the basin). "Other Sources" are also frequently cited as contributing to impacts/threats. These other sources include in-lake nutrient recycling (Greenwood Lake) and unspecified other sources that represent possible future threats to drinking water supplies.

Insert Figure 2 - Basin Water Quality Assessment Map

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The Ramapo/Hackensack River Basin Waterbody Inventory/Priority Waterbodies List

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

The data sheets are presented in hydrologic order, beginning with the most downstream waters and continuing upstream through the basin. Waterbody data sheets are grouped by US Geological Survey Hydrologic Unit Code (HUC) basin and presented as separate sections of this report (see Figure 3). A Waterbody Inventory of the specific waterbody segments in each watershed is included at the beginning of each watershed section.

Data sheets are included for each waterbody that has been assessed; i.e., waterbodies listed as *Impaired Waters* (Not Supporting Uses), Waters with *Minor Impacts*, *Threatened Waters*, waters with water quality impacts ***Need Verification***, or waterbodies with *No Known Impact*. *UnAssessed* waterbodies are included in the Waterbody Inventory for each watershed, but because they have not been assessed data sheets for these waters have not been included.

The information outlined on the data sheets includes *Waterbody Location Information*, *Water Quality Problem/Issue Information*, *Resolution/Management Information* and *Further Details*. See *Appendix B – Waterbody Inventory Data Sheet Background Information* for more details about the data sheets.

Note that the assessments in this report reflect 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 information is updated, the data sheet for the corresponding waterbody segment is issued with the date of revision. More recently revised data sheets supercede the corresponding waterbody information in this listing.

Following the individual waterbody data sheets in the watershed sections, a *Summary Listing of Priority Waters* provides a brief overview of all *Priority Waterbodies*, i.e., waterbodies listed as *Impaired Waters* (Not Supporting Uses), Waters with *Minor Impacts* and *Threatened Waters*.

Indices of waterbody data sheets by both county and alphabetically by segment name are included as Appendix C and D, respectively.

Insert Figure 3 - Watershed Map