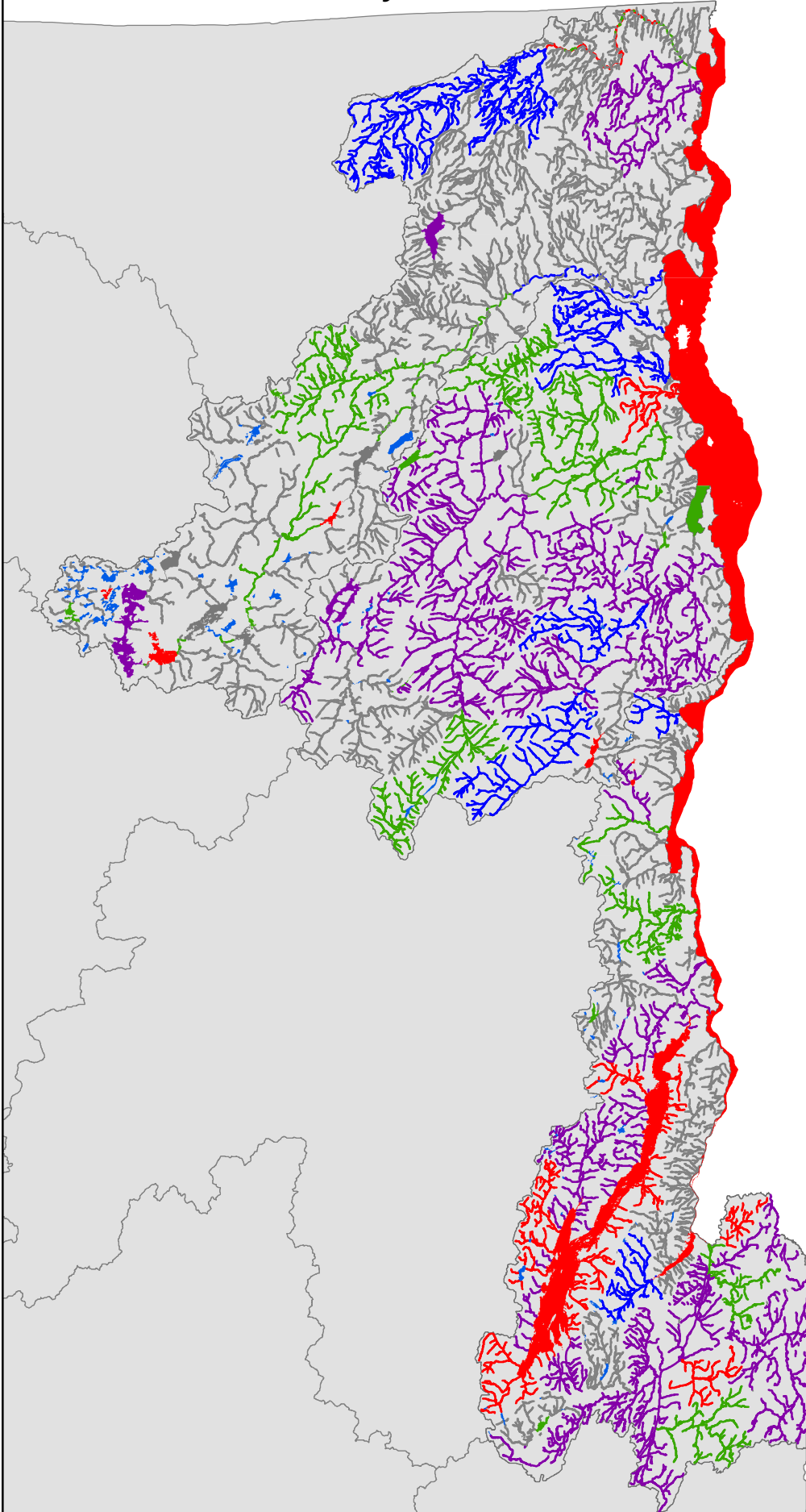
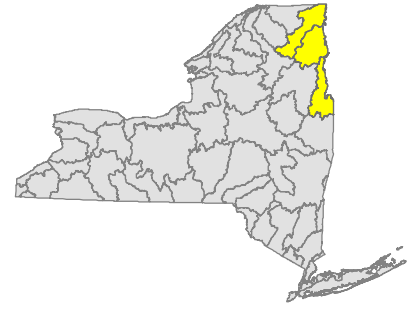


# Lake Champlain Basin

## WI/PWL Water Quality Assessment



**Assessment**

**Lake/Reservoir**

- Impaired Segment
- Minor Impacts
- Need Verification
- No Known Impact
- UnAssessed

**River/Stream**

- Impaired Segms
- Minor Impacts
- Need Verification
- UnAssessed
- No Known Impact

0 2.5 5 10 15 20 Miles

# The Lake Champlain Basin

## Basin Description

The Lake Champlain Basin drains the area between the Adirondack Mountains in northeastern New York State and the Green Mountains in Vermont. The long, narrow Lake Champlain empties into the Richelieu River at its northern end where its waters then flow into Canada and the Saint Lawrence River. The basin covers about 8,234 square miles, just over 3000 (37%) of which lies in New York State; 56% lies in Vermont and 7% in Quebec, Canada. Within New York State the basin drainage area includes most of Clinton County, large parts of Essex County, and portions of Franklin, Warren and Washington Counties.

The population of the entire Lake Champlain Basin totals nearly 608,000 people (1990). About 176,500 New Yorkers live in the basin year-round; there is a significant seasonal population increase during the summer months. The largest and only significant population centers in New York are Plattsburgh (38,486) and Queensbury (22,630); Burlington (51,936) and Rutland (18,230) are the largest population centers in Vermont. Much of the basin (62%) is forested and, within New York State, ranges from the wilderness High Peaks area of the Adirondacks to Lake Plain Lowlands. About 28% of the basin is agricultural lands. In New York, Washington County and northern Clinton County are significant agricultural areas.

There are about 4,883 miles of rivers and streams and 235 significant\* lakes, ponds and reservoirs (covering 159,302 acres) in the basin. Lake Champlain, with a surface area of 435 square miles (278,480 acres), is the dominant feature of the watershed, covering about 5% of the entire basin. Within New York State, the lake itself covers 97,073 acres and accounts for about 61% of total lake acres in the basin.

## Water Quality Issues and Problems

With its light population and large tracts of forest wilderness, water quality in the Lake Champlain Basin is generally good to excellent. The most significant water quality problems in the basin impact the lake itself: fish consumption advisories, excessive nutrient loadings, invasive/exotic plant and animal species and atmospheric deposition. These and other water quality issues in the basin are discussed below.

### *Fish Consumption Advisories*

Although Lake Champlain supports a wide variety of uses, fish consumption of some species taken from the lake is restricted by a NYS DOH health advisory due to PCB and mercury contamination. The advisory recommends eating no more than one meal per month of larger lake trout (over 25 inches) or walleye (over 19 inches). One significant source of PCBs is lake sediment in Cumberland Bay; ongoing remediation activities in the bay are expected to reduce this source. Other continuing sources of PCBs to the lake have yet to be identified. The mercury contamination is widely thought to be a result of atmospheric deposition. A separate advisory limiting consumption of walleye from the Poultney River due to mercury has been issued by Vermont.

### *Phosphorus*

In addition to restrictions on fish consumption, of equal concern are impacts on public bathing, other recreational uses (swimming, fishing, boating) and aesthetics in Lake Champlain from elevated phosphorus concentrations. In 1993 a Water Quality Agreement between New York State, Vermont and Quebec established in-lake total phosphorus criteria. New York State and Vermont then completed a study to

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

measure point and nonpoint source phosphorus loads to the lake, develop a whole-lake phosphorus budget, and develop a load reduction strategy to attain the in-lake criteria. This study – the Lake Champlain Diagnostic-Feasibility Study – found phosphorus to be at or above the criteria (which ranges from 10 to 25 ug/l) in much of the lake. The elevated concentrations contribute to excessive algal and vegetative growth in the lake. In 1996, the states agreed to a phosphorus reduction strategy that includes specific loading targets for various lake watersheds. The goal of the strategy, which was endorsed in the *Lake Champlain Basin Plan - Opportunities for Action* Report, is the reduction of excess loads by 25% every five years for a 20 year period. These reductions are to be met using an appropriate mix of point and nonpoint source actions to be implemented in the watersheds. Development of a TMDL to address phosphorus is planned by both New York State and Vermont.

### *Invasive/Exotic Species*

Exotic and invasive plant and animal species are also an increasing threat to the lake and other waters of the basin. Zebra mussels are widespread and have impacted water supplies and crowded out native mussels in many areas. Water chestnut and Eurasian milfoil limit various recreational activities and alter riparian cover. Sea lamprey predation appears to be increasing after some decline following a lake-wide control program. Without further controls the Atlantic salmon and lake trout populations are likely to be significantly affected. Additionally, the presence of alewives in neighboring Lake Saint Catherine pose a threat to larger cold water species. The ability to control many of these exotics is limited, expensive and the long-term success is relatively uncertain.

### *Acid Rain/Atmospheric Deposition*

Low pH attributed to atmospheric deposition/acid precipitation has been documented in many small lakes and ponds in the basin. Such conditions are known to have a significant impact on aquatic ecosystems, impairing and often precluding the propagation and survival of fish in some lakes and ponds. Previous water quality assessments and Priority Waterbodies Lists have included large numbers of smaller (less than 10 acres) lakes and ponds impacted by acid rain/atmospheric deposition. However, with the expansion of the WI/PWL database to accommodate all waterbodies, it was necessary to limit the tracking of individual lakes to those 0.01 square miles (6.4 acres) in size or larger.

Although these lakes and ponds are no longer tracked individually, and the lake area affected as a percentage of total lake area in the basin is not that large, acid rain/atmospheric deposition remains a significant water quality issue affecting a large number of waterbodies in the basin.

Previous Priority Waterbodies Lists included a significant number of small lakes impacted by acid rain/atmospheric deposition. However, with the expansion of the WI/PWL database to accommodate all waterbodies, it was necessary to limit individual listing of smaller lakes. Although these lakes and ponds are no longer listed separately, and the sum total lake area affected is not that large a percentage of the total lake area in the basin, acid rain/atmospheric deposition remains a significant water quality issue affecting a large number of waterbodies in the Lake Champlain Basin.

### *Excessive Sand and Sediment Loads*

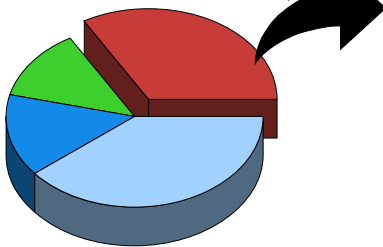
The fishery habitat in many tributary streams of the basin is affected by sand and sediment loads. Stream and road bank erosion of naturally sandy soils are a primary source of sand/sediment. In some areas of the basin winter road sanding practices are also thought to be a significant source. In these instances, sand applied to roads during the winter runs off into streams during the spring snowmelt. Once in the stream, the sand and sediment fills in gravel spawning beds, decreasing salmonid spawning success, limiting

macroinvertebrate production, and increasing winter mortality of fish and invertebrates due to loss of escape cover from the effects of anchor ice. Percent embeddedness of the stream has shown a reliable correlation to restriction of trout/salmon spawning habitat. Reproduction is very limited at 30-40% embeddedness. Studies of some streams in the basin show embeddedness values as high as 70%.

Excessive sand and sediment loads also contribute to the formation of significant sedimentation deltas at the mouths of many tributary segments. Such deltas can impede recreational boat navigation, restrict fish migration into the tributaries and present opportunities for the establishment of non-native aquatic vegetation. Impacts related to sediment deltas are particularly well-documented in Lake George.

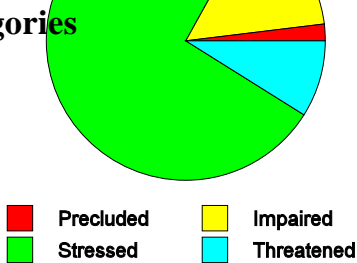
## Rivers/Streams

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



- Priority Waterbody Segments
- Segments Needing Verification
- Waters with No Known Impacts
- UnAssessed Water

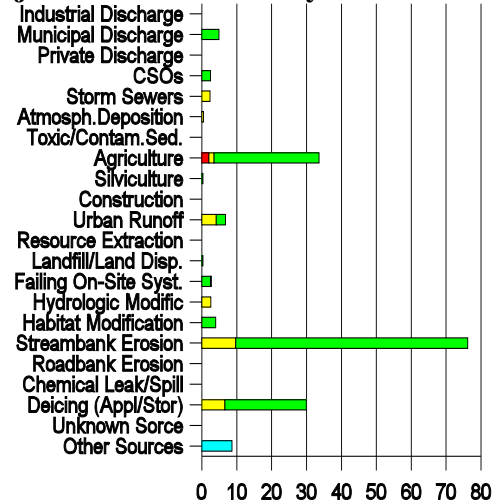
### Severity of Problems (PWL Segments only)



- Precluded
- Stressed
- Impaired
- Threatened

**Lake Champlain Basin**  
 Total River Miles: 4883  
 Total PWL Miles: 1633

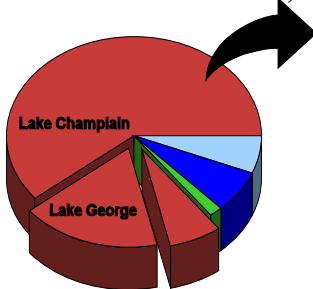
### Major Sources to Priority Waterbodies



Percent of PWL Waters Affected

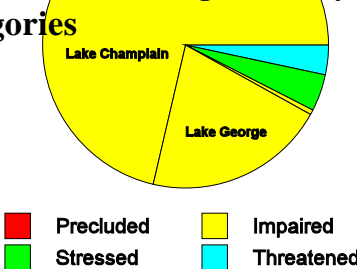
## Lakes/Reservoirs

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



- Priority Waterbody Segments
- Segments Needing Verification
- Waters with No Known Impacts
- UnAssessed Water

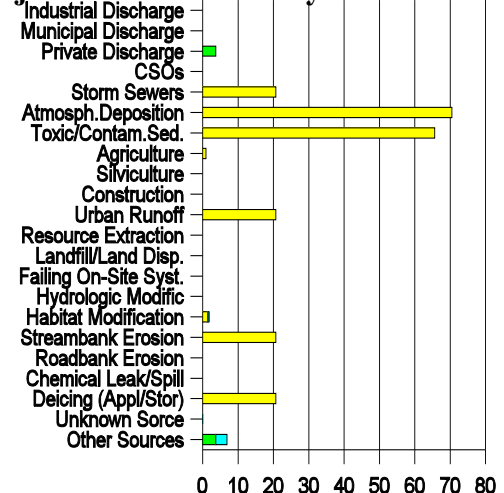
### Severity of Problems (PWL Segments only)



- Precluded
- Stressed
- Impaired
- Threatened

**Lake Champlain Basin**  
 Total Lake Acres: 159,302  
 Total PWL Acres: 135,936

### Major Sources to Priority Waterbodies



Percent of PWL Waters Affected

## **Basin Water Quality Summary**

Sixty percent of the river (and canal) miles in the Lake Champlain Basin have been assessed. About 33% of the total river miles in the basin (or 1633 miles) are listed on the Priority Waterbodies List. However, over 70% of these PWL miles are listed as *Stressed* waters that fully support appropriate uses. Eighteen percent of basin river miles are *Precluded* or *Impaired* and do not fully support appropriate uses.

About 93% of lake acres in the basin have been assessed, with about 85% of lake acres in the basin listed on the PWL. This high percentage of listed lake waters reflects the effects of water quality impacts on the two largest lakes in the basin. Specifically, a fish consumption advisory on all of Lake Champlain proper accounts for 71% of the lake acres listed; water quality impacts on Lake George account for another 21% of listed waters. The relative contributions of these two lakes are shown in the charts. Additionally, a large number of smaller lakes (less than 6.4 acres) that are too small to be listed separately are affected by acid rain/atmospheric deposition, a significant water quality issue in the basin (see discussion on page 6).

Atmospheric deposition and toxic/contaminated sediments appear as significant sources due to their contribution to the fish consumption advisory for Lake Champlain. Impacts from streambank erosion, road sanding and agricultural activities are the most prominent basinwide. In the few more developed areas of the basin, urban runoff and storm sewers are listed as major sources of pollutants.