Genesee River Basin Description

Introduction to the Watershed

The Genesee River receives drainage from about 2,500 square miles, including portions of Genesee, Livingston, Wyoming, Monroe, Allegany, Steuben, Ontario, Orleans, and Cattaraugus counties in New York and Potter County in Pennsylvania. It's 157 mile long northern journey begins at an elevation of 2500 ft above sea level in the Allegheny Hills of Pennsylvania, flowing through the highly dissected Northern Allegheny Plateau to Letchworth State Park near Mt Morris in Livingston County (average stream slope of nearly 9 feet per mile), and then through the Lake Ontario Lowlands (average stream slope of 0.8 feet per mile), before flowing into Lake Ontario (elevation 247 feet above sea level) at the Port of the City of Rochester in Monroe County, New York State. The Genesee Basin has been separated into two primary hydrologic units, the southern Upper Basin, representative of the Allegheny Plateau) and the northern Lower Basin representative of the Lake Ontario Lowlands). The boundary between the basins is located approximately 6 river miles downstream of the Mount Morris Flood Control Dam, at the base of the Letchworth Gorge, and immediately downstream from the confluence of Canaseraga Creek with the Genesee River. The Genesee Basin includes 24 separate watersheds containing a total of 5,048 miles of streams. The Genesee Basin also includes lakes, ponds and reservoirs (covering 13,288 acres) in the basin. Of these lakes, the four largest (Mount Morris Dam Impoundment and three of the smaller Finger Lakes: Conesus Lake, Hemlock Lake and Honeoye Lake) represent over 80% of the total amount of lake acres in the Genesee Basin.

Climate (past, present, and future), topography, and geology are among the most important environmental variables that define the nature of rivers and their watersheds. In the case of the Genesee River Basin, past climatic conditions, principally the reoccurring advancement and recession of continental glaciers, has been responsible for the basin's present topography, hydrology and soils.

During the Pleistocene Epoch of Earth's history, which extended from about 2.6 million years ago to about 12,000 years before the present, glaciers periodically covered nearly a third of Earth's land area. The entire Genesee River drainage basin was covered by glacier ice when the last glacial advance (Wisconsinan Stage) reached its maximum extent around 21,000 years ago. By the time the glacier permanently receded, around 12,000 years ago, the Genesee River's drainage area had been well-established. Stream flows during the glacial recession period, were augmented greatly by glacial meltwater and by the cool, moist postglacial climate. Evidence of the early Genesee River's size and eroding power can be seen today in the magnificent gorge at Letchworth State Park (Grand Canyon of the East), near the Village of Mt. Morris, and the river gorge downstream from High Falls in the City of Rochester. Hills in the higher elevations of the watershed were eroded by the glacier. As a result the terrain has a more rounded and smooth character compared to un-glaciated areas further south in Pennsylvania. The glacier widened and deepened pre-glacial north-south aligned valleys of the Genesee River and some of its tributaries, as well as those of the Finger Lakes, which were formed by the terminal moraines of deposited debris at the southern-most advancement of the glacier. As the glacier receded, meltwater with its carried sediment moved into these valleys, forming both temporary and the permanent lakes. The glacier's erosion and transport of pre-glacial soils and bedrock served to expand, further to the south of the basin, the distribution of calcareous material, which originated in the limestone-based bedrock escarpments in the north of the basin. As this glacial deposited sediment was worked and transported by meltwater-enhanced stream flows, some sediment deposits were graded by size. Large beds of gravel and sand were formed which now are high producing groundwater aquifers. Finer sediments formed deep deposits in the widened valleys and also in the lowland areas of the post-glacial precursors of Lake Ontario, producing large areas of fertile soils.

As the glacier receded, hunting parties of the native peoples gradually increased their range northward into the Genesee River Basin, from the un-glaciated areas to the west and south. Seasonal hunting camps and then permanent villages became established as improving climate fostered a transition from a hunting/gathering migratory culture into more permanent settlement with the addition of growing vegetable crops (i.e. corn, squash, beans). In the period leading up to the European Settlement of North America, the Iroquois Confederacy was the most important Nation of native peoples in New York State. The Iroquois call themselves Haudenosaunee meaning "people of the long house." At that time the confederacy included 5 Sub-Nations; Mohawks, Oneidas, Onondagas, Cayugas, and Senecas, with the Tuscaroras joining in 1722. The Senecas' homeland includes the Genesee River Basin. The Iroquois coexisted peacefully with the Dutch and allied with the British in the French and Indian War. During the Revolutionary War the Iroquois continued their alliance with the British. In 1779 American forces invaded the Seneca homeland and defeated the Senecas.

By 1797, much of the Senecas' homeland was surrendered to New York land speculators in a series of treaties. New settlers began entering the Seneca lands soon after and the first clearing of the forest and planting of fields occurred in those large relatively flat areas of fertile soils located in the Lake Ontario lowlands near the mouth the river. The river provided power for the first saw mills for timber and grist mills for grain. The origin of the City of Rochester was the area near the High Falls, upstream from the Genesee River's mouth, where the first mills were

built to serve the farming communities in the surrounding areas. The river was also used to float timber and transport grain crops by boat downstream to the mills. The locations of the many smaller communities throughout the River Basin, were also determined initially by the proximity to a waterbody with the capability to power saw and grist mills. In 1825, the City of Rochester began to benefit from being located on the Erie Canal. Markets could be expanded and there was an increase in population and settlement areas within the northern portion of the river basin. From these roots, the City of Rochester/Monroe County area has continued to grow and become the most populated and developed area in the Genesee River Basin. The Rochester area has been home to several nationally known corporations, including: Bausch and Lomb, Xerox, Eastman Kodak, and Paychex. Three hydroelectric stations currently use the river water to run turbines to generate electricity. These stations are located at the base of each of three water falls associated with the river gorge in the City of Rochester.

Current land use within the watershed is approximately 52 percent agricultural, 40 percent forested, 4 percent urban, 2 percent wetlands or water, 2 percent other developed lands. The southern portions of the River Basin in the Northern Allegany Plateau are dominated by forested land and some agricultural. Central and North Central portions of the River Basin are dominated by extensive agricultural development, which primarily in support of dairy farming. However, orchard and vegetable crops are also grown. Within the Basin, water resources are utilized to irrigate agricultural crops.

The Genesee River Basin has yielded enormous benefits to its residents, embodied by a variety of land and water uses such as navigation, recreation, energy production, wildlife habitat, and fresh water for drinking, irrigation, industrial uses and sanitation.

II. Threats to Watershed

The Genesee River Basin is a resource of intense historical, ecological and cultural value. The lands and waters of the Basin have always been a source of great wealth to its inhabitants, both in terms of production and beauty. The Basin has at times been a source of great turmoil, however, as exemplified by destructive flooding, rapid industrial expansion and decline and continuous fluctuations in human settlement patterns. Throughout its 10,000 year geologic history, the Genesee River—the primary drainage channel of the Basin—has continued its steady journey north to Lake Ontario, carving deep trenches through the highlands of the Allegany Plateau and routinely depositing fertile soils throughout the Genesee Valley below. The Basin itself is divided into two primary drainage basins, together containing a total of twenty-four separate watersheds, each with its own unique physical, environmental and social characteristics. As the River meanders northward, an enormous volume of water is gathered from these catchments, creating a flow of significant volume and strength by the time it reaches the City of Rochester and exits into the immense holding tank that is Lake Ontario, one of the five lakes that comprises the Great Lakes Basin.

The U.S. portion of Lake Ontario's shoreline and watershed lies wholly in New York State. New York's Lake Ontario coastal waters are a valuable resource for drinking water, recreational boating, fishing and swimming, tourism, and waste water processing, and a key asset in the economic revitalization of upstate New York.

But in spite of intensive study and significant water quality improvements in the open, offshore waters of the Lake over the last three decades, critical gaps in information and lingering impairments remain in the 322 miles of shoreline. River and creek mouths and embayments

suffer from many impairments that limit their recreational use, elevate the cost of drinking water withdrawals that serve over a million customers, including the Rochester and Syracuse metropolitan areas. These lingering impairments affect the region's recreation and tourism based economy and property values, reliant on high quality water resources. Impairments of drinking water quality, shoreline property values, and the attractiveness of the lakeshore to shoreline residents, the general public using the beaches and walking the shoreline, tourists and boaters are continuing concerns.

In addition to the need for a watershed plan that meets EPA's criteria, the Genesee River watershed has other issues that frame the magnitude of its impairment and relation to the larger picture of Lake Ontario near-shore water quality. Those issues include the following:

1. Many streams in the Genesee River watershed are on New York State's 303(d) list of streams impaired for total phosphorus;
2. The near-shore waters of Lake Ontario which are also listed on NYS's 303(d) list as being impaired for phosphorus;
3. Many streams and tributaries in this region are listed in NYS's Lake Ontario **Biodiversity Conservation Strategy** as a "priority action site for non-point source and nutrient control"; and
4. Streams and tributaries are highlighted in the Rochester Embayment Area of Concern (AOC) as a significant contributor to their Beneficial Use Impairment (BUI) for Eutrophication or Undesirable Algae.

The **Rochester Embayment Remedial Action Plan** has identified targets and indicators that can be used to document that a Beneficial Use Impairment (BUI) is being restored. Two of those BUI's are addressed by this project: Beach Closings and Eutrophication or Undesirable Algae. (Link to more detail: http://www.epa.gov/glnpo/aoc/rochester.html) CEI is an active member of the Rochester RAP Advisory Committee.

The Genesee River Basin and the Lake Ontario near-shore waters of Orleans, Monroe and Wayne counties face serious water quality issues: swimming beaches are closed more than they are opened, excess algal growth makes streams and shorelines unpleasant and unhealthy, over 30 streams are classified as impaired, fisheries are stressed by poor water quality, and drinking water is threatened.

Most citizens in this region have seen algae in the waters of this region. It can vary in intensity from a nuisance to a health hazard. Excess nutrients, such as phosphorus, cause algae blooms, which contribute to beach closings along the Lake Ontario coast.

Current levels of phosphorus and other contaminants have led to over 30 water bodies (rivers, streams, creeks, ponds and lakes) to be listed as impaired by the New York State Department of Environmental Conservation. The most prevalent cause for the impairments identified for these water bodies is phosphorus.

Silt and sediment transport and the accompanying increase in turbidity are additional concerns. Within the Genesee River Basin, sources of sediment include erosion from rapid river channel migration, streambank instability, agricultural lands, increased development, roadside ditching, and wetland displacement. Establishment and protection of adequately sized vegetated buffers along stream corridors and stream bank restoration projects are examples of actions to reduce impacts. Other pollutants and threats include pathogens, thermal changes, oxygen demand, priority organics, and degradation of habitat for fish, wildlife, and other aquatic life.

The US Army Corps of Engineers and the Genesee/Finger Lakes Regional Planning Council published a report in October 2004 entitled: Genesee River Basin Action Strategy (http://www.gflrpc.org/Publications/GenRiverActionStrategy.htm). It compiled information available about the state of the Genesee River watershed and on-going assessment, outreach and implementation activities in this "State of the Basin" report. They concluded that "disjointed, reactionary measures have proven to be inadequate means of addressing variant forms of pollution and their cumulative impacts on local human and wildlife communities. If the uses that are enjoyed in the Genesee River Basin are to be sustained over a prolonged period of time, an active and focused planning and management effort will be required across all relevant organizational and administrative levels."

Currently, a multitude of organizations have interests in parts of the Genesee River Basin. CEI believes that a coalition of organizations focused on the entire Genesee Basin will be better able to mobilize wide public support, attract funding, design efficient improvement projects and advocate for water quality standards than the present fragmented system. This need has been voiced by several of the target organizations, who have also suggested that CEI is well-positioned to be the catalyst for such an effort, including those listed below.

- Finger Lakes Institute
- City of Rochester
- SUNY Brockport
- Rochester Area Community Foundation
- The Nature Conservancy
- Genesee/Finger Lakes Regional Planning Council
- Monroe County
- Finger Lakes – Lake Ontario Watershed Protection Alliance

Ongoing releases of phosphorus from agricultural activities such as crop growth and dairy farming, food processing operations, municipal and industrial wastewater treatment plants, and septic systems have contributed to these existing problems. In addition this problem could be exacerbated by our region's emphasis on food processing, agriculture, and relaxation of environmental regulations for concentrated animal feeding operations. While many organizations are currently involved with various aspects of this problem, no one organization coordinates or facilitates the prioritization of activities to enhance our region's ability to attract its share of federal and state funding to restore water quality.

CEI has a long history of working to improve our region's water quality. We understand the issues and have a proven track record of building partnerships and working collaboratively. We decided to launch our Genesee RiverWatch initiative to lead the way to reduce the number of streams that are classified as impaired, keep our beaches open for swimming, improve the overall health of our region's aquatic ecosystems, and achieve safe and healthy use of our waters while promoting economic development.