Geography

Onondaga Creek Fact Sheet

INTRODUCTION

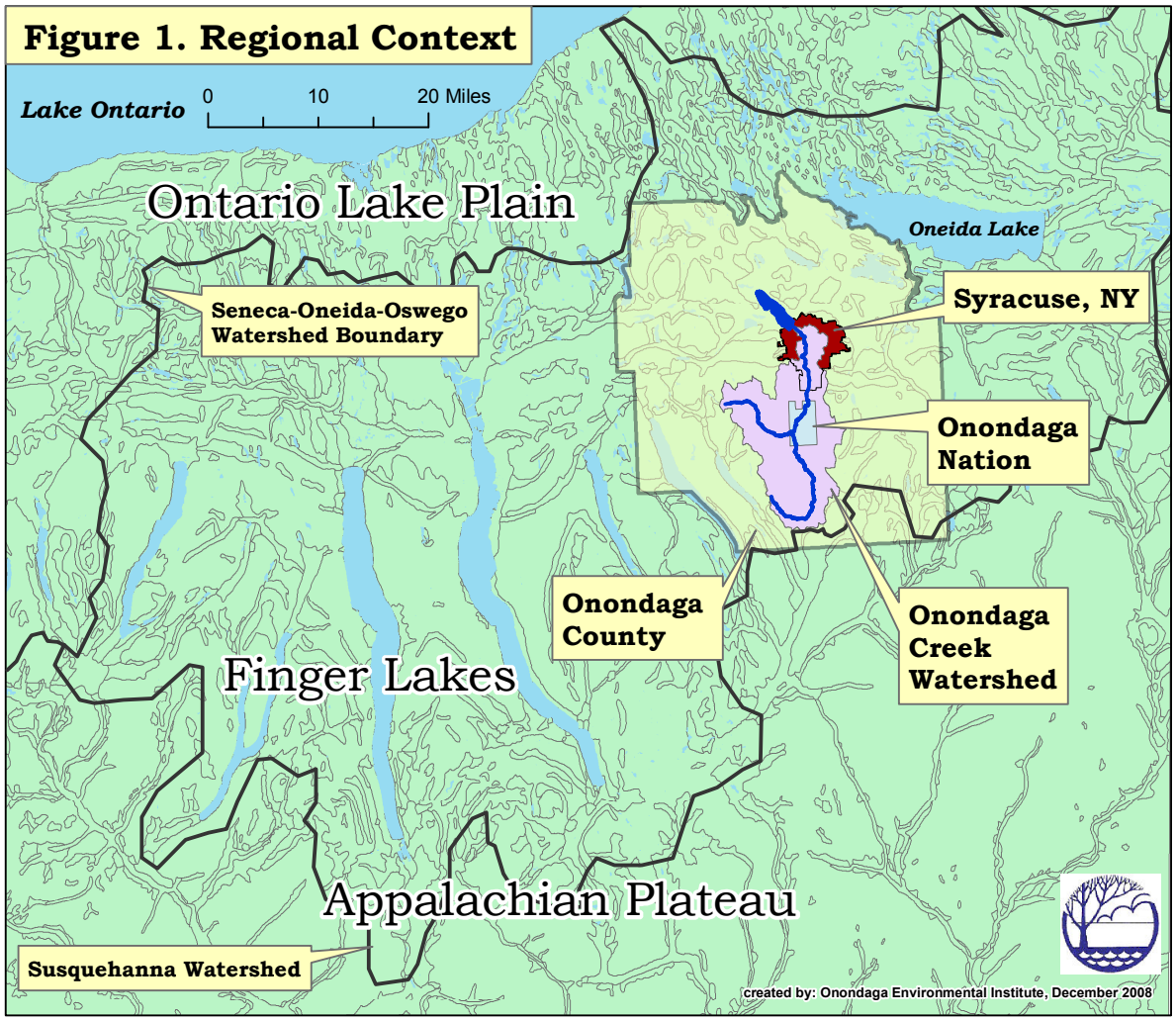
Onondaga Creek is part of the Seneca-Oswego-Oneida River basin. Two main branches of Onondaga Creek, one in Tully Valley and one in West Branch/Cedarvale, join near the Onondaga Nation border.

Watershed flow is generally northward towards Onondaga Lake.

Outflow from Onondaga Creek is nearly forty per cent of the water flowing into Onondaga Lake. (EcoLogic LLC, 2003) Onondaga Lake outflows to the Seneca River, which joins the Oneida River at the Three Rivers junction near Phoenix, NY, to form the Oswego River, a major tributary of Lake Ontario.

Major watersheds Lake Ontario, part of the Great Lakes system, outflows to the St. Lawrence River/St. Lawrence Seaway that empties into the North Atlantic Ocean. Small-scale shipping and recreational vessels can thus reach the mouth of Onondaga Creek from a vast region.

Political boundaries Centrally located in the watershed is the Onondaga Nation, which has a treaty relationship with the U.S.A. Surrounding the Onondaga reservation, the creek watershed is situated in Onondaga County, NY (Figures 1, 2, and 3).



FINDINGS

Creek Length Currently, the maximum creek length is estimated in a range of 27.1 to 27.4 miles (W. Coon, 2005) to 33.04 miles (USGS and USEPA, 2004). Historically the creek was much longer and more sinuous. In 1927, the section of the creek upstream (south) of Seneca Road (Turnpike) was said to have a "tortuous channel [of] about 28 miles (Syracuse, 1927)." The companion section from Seneca Turnpike downstream (north) to the outlet is currently (in 2006) around six miles. Due to the dynamic changes in meanders through relatively flat land, channel shape and length can change quickly in the non-engineered sections of the creek, so lengths should be viewed as approximate. This composite of at least 34 miles around 1927 is significantly longer than the current approximation of 27.2 miles. This suggests that projects that increased the creek depth and channeled its banks shortened its overall length. A GIS summation of measured small segments (Onondaga Environmental Institute analysis of data from USGS and USEPA, 2004) shows a creek length of 33.04 miles, which may reflect the greater sensitivity to meanders in the small scale measurements. Due to the sinuous pattern of the upland reaches, the creek's headwater near Bailey Rd. in Otisco, NY, is only about sixteen miles "as the crow flies" from the mouth at Onondaga Lake.

Tributaries Onondaga Creek has over sixty-six tributaries altogether. Over fifty of them are tributaries of the South and West branches (NYSDEC-DOW, 1996). The east fork has thirty-nine tributaries; the major ones include Emerson Gulf, Falls Creek in Rattlesnake Gulf, and Rainbow Creek. The west fork, which is technically a tributary of the main channel, has over eleven tributaries (NYSDEC-DOW, 1996), with two major ones being Peppermill Gulf and Pumpkin Hollow (see Figure 3). Downstream of the junction of the two forks, the main channel has sixteen identified natural tributaries (NYSDEC-DOW, 1996). The natural streams Hemlock/Kennedy Creek, Commissary Creek, and William Creek join Onondaga Creek inside the Onondaga Nation. Downstream of the Nation, the partially-covered (culverted) streams, Kimber Brook, Cold Brook, Furnace Brook, and some unnamed streams such as the former Town-Line Creek, join the creek within the City of Syracuse.

Table 1. Watershed Dimensions for Onondaga Creek

WATERSHED DIMENSIONS	METRIC UNITS	Ref	ENGLISH UNITS	Ref
Onondaga Lake Watershed	738 square km.		285 square miles	1
Onondaga Creek Watershed	288 sq. km		111 square miles	2
North –South maximum watershed width	30.7 km.		Eighteen miles	3
East-West maximum watershed width	16 km.		Ten miles	3
Onondaga Creek (Otisco to Onondaga Lake):				
Main Channel length, reported	44.2 km.	4	27.2 miles	5
Main Channel length, summed small segments (captures more detail of curves)	53.18 km.		33.05 miles	6
North Branch, main channel length, summed	25 km.		15.54 miles	
South Branch, main channel length, summed	28.18 km.		17.51 miles	
West Branch, main channel length, summed	15.43 km.		9.59 miles	7
Highest elevation in watershed, Dutch Hill			1879 ft.	
Highest tributary elevation, Dutch Hill			1760 ft.	
Headwater elevation, Bailey Rd., Otisco, NY			1483 ft.	8
Elevation at mouth at Onondaga Lake			363 to 365+ ft	9

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1 William Kappel, US Geological Survey. Personal communication. (2006)
2 US Army Corps of Engineers (1987) cited in Higgins.
3 Measuring tool at www.ongov.net GIS site
4 Onondaga County (2001)Ambient Monitoring Program Report.
5 Pers. Comm. W. Coon, USGS, Ithaca, NY.
6 Addition of stream stretches in USGS GIS
7 Addition of stream stretches in USGS GIS. This differs from other mapping in that the Pumpkin Hollow wetland is not treated as open stream
8 US Geological Survey, 1955 Otisco Valley Quadrangle.
9 New York State Barge Canal Bridge data. - http://www.canals.state.ny.us/

Figure 2. Major Subwatersheds

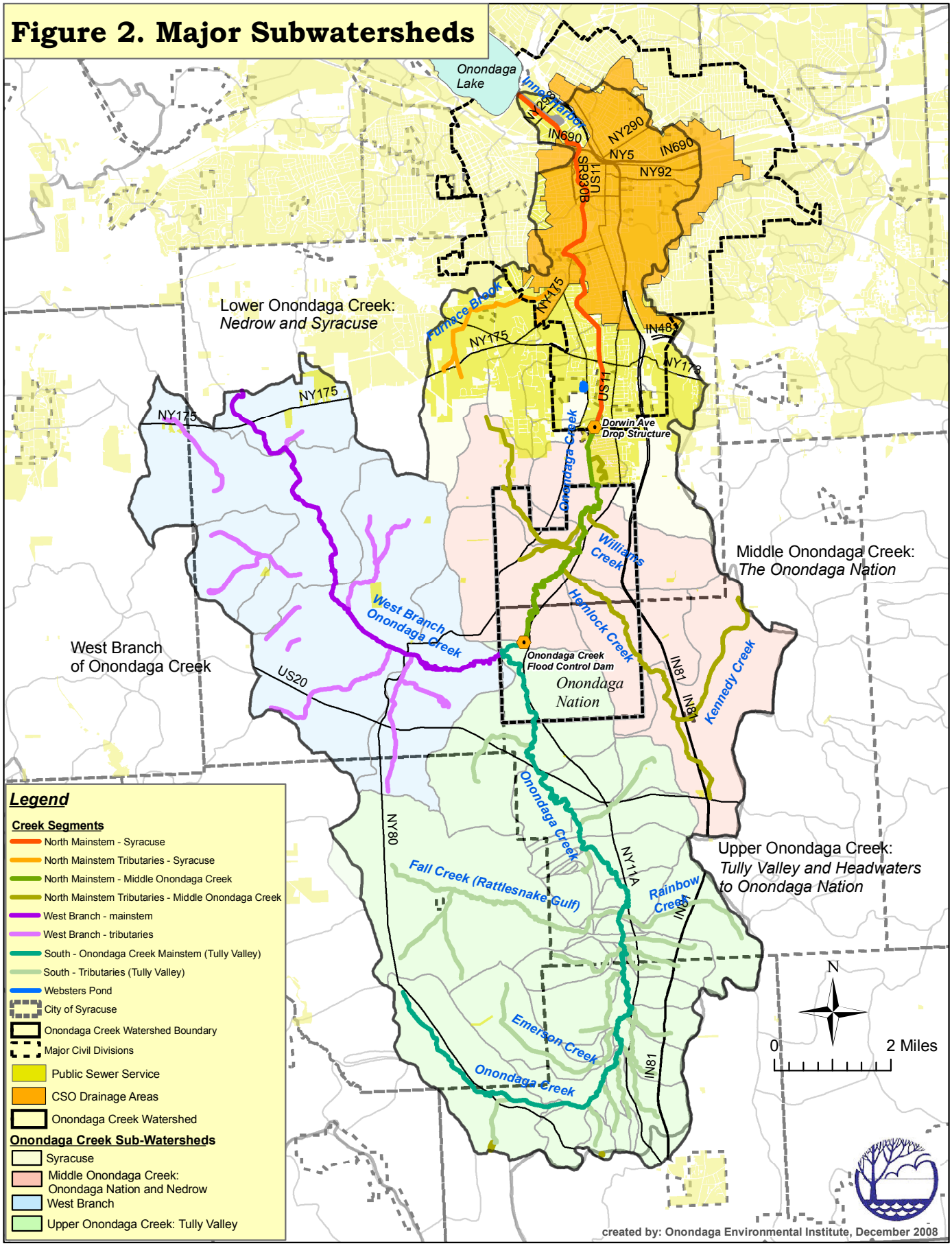
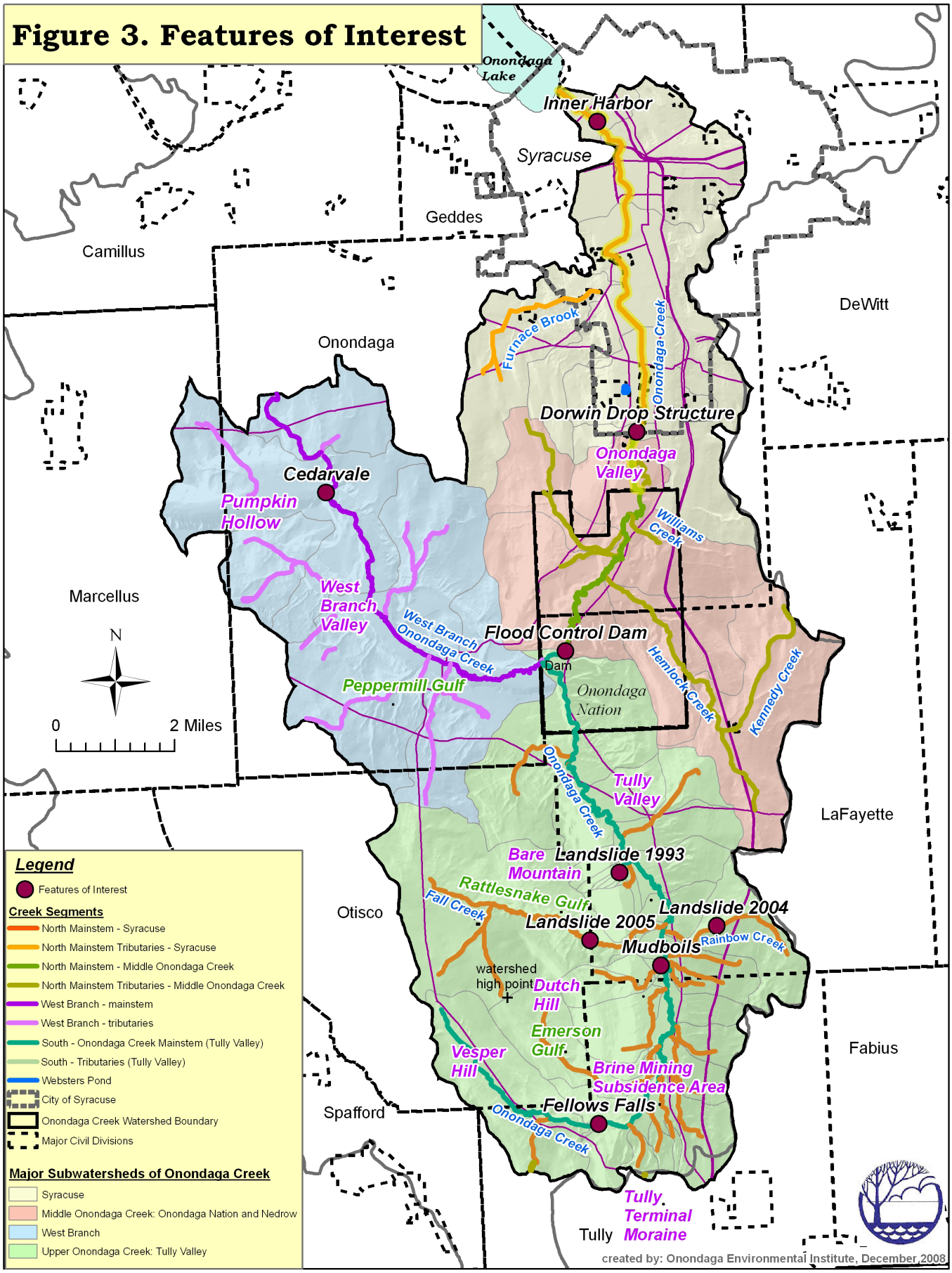


Figure 3. Features of Interest



The urban stretch (see Figures 2 and 3) of the main creek channel receives water from forty-nine overflow points in the urban sewer system (Onondaga Lake Improvement Project webpage, Aug. 9, 2007), approximately seven natural tributaries, and numerous bridge and road run off drains. The conversion of combined sewers to separated sewers is ongoing. More information is available at http://www.lake.onondaga.ny.us. In the city, several natural tributaries are routed underground and re-emerge as surface water at the main channel of the creek.

Sewers See Figure 2 that shows the extent of municipal sewers. The rest of the watershed has either septic systems or no constructed sanitation (NYSORPS, 2005).

Inner Harbor and the Barge Canal (New York State Canal Corporation) In Syracuse, much of the creek channel has been relocated since the initial settlement of the city in the early 1800s (Holmes, G.D., 1926). Circa 1867, the mouth of Onondaga Creek was reconstructed to the southwest of its natural outlet, at first to speed up sewage discharge to the lake (Bruce, 1891), and later further altered to develop a commercial barge harbor on Onondaga Lake (Whitford, 1906). Today, the Inner Harbor (Figure 3) is an inactive terminal of the New York State Barge Canal System (New York State Canal System, 2006). The Barge Canal system includes the Seneca and Oswego Rivers as far as the Port of Oswego on Lake Ontario.

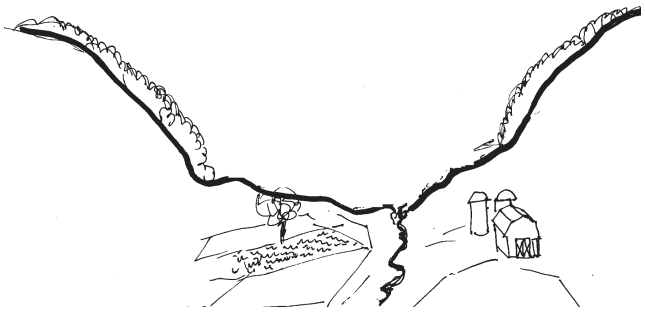
Hydrologic Location The New York State Department of Transportation closely regulates water levels in the Barge Canal sections of the Seneca, Oneida, and Oswego Rivers. On Onondaga Creek, a dam, channel sections constructed with increased flow capacity, and water monitoring gauges all function as part of a flood control plan for the creek that was developed to retain canal water levels while simultaneously preventing flooding in urban areas (Syracuse NY Intercepting Sewer Board. and G. D. Holmes [1927]).

Characteristic shape of the watershed Wide "bowl-like" watersheds tend to flood more than narrow "trough-like" watersheds. The Onondaga Creek watershed contains both features. Its major branches are trough-like, yet they join together to form a more bowl-like drainage basin. Drainage in steeply-sloped watersheds tends to be more rapid and transient, while shallow slopes contribute to water accumulation and slower removal.

In southern Onondaga County, the upland headwater of the creek is fed by steeply-sloped tributaries with waterfalls, rapid flow, and stream bank erosion, all characteristic of the hanging valleys in the Appalachian Plateau. The tributaries receive water from forested and agricultural uplands above the hanging valleys. The tributaries drop steeply, with some waterfalls, to the two main branches in the valley bottoms that join to form the creek's main channel. On the floors of the Tully and Onondaga Valleys, the water typically moves more slowly, forming natural meanders with a history of flooding. The bottoms of the two branch valleys and the main channel are on an ancient lake bed, (Kappel, W. M. and T. Miller, 2005) surfaced with silt loams and wetland soils (Hutton, 1977). On that relatively flat surface, the two creek branches join near the southwest border of the Onondaga Nation, through which the main branch meanders northward, passing through a flood control dam about 518 meters downstream of the junction between the two branches (Higgins, 2005). Downstream of the Onondaga Nation, an engineered, incised channel controls creek flow through urban areas in the Town of Onondaga and the City of Syracuse. The artificially deep and sloped channel was built to make the water run faster, as well as deeper, and thus reduce or eliminate floods in populated areas. The creek outlet is part of the Inner Harbor on Onondaga Lake, and located on the lake shoreline between the METRO sewage treatment facility to its west and Carousel Mall to its east.

Four Land Use Areas in the Onondaga Creek Watershed (Figures 2 and 3) roughly correspond to four functional assemblages of subwatersheds. Sketches are cartoons, and not to scale.

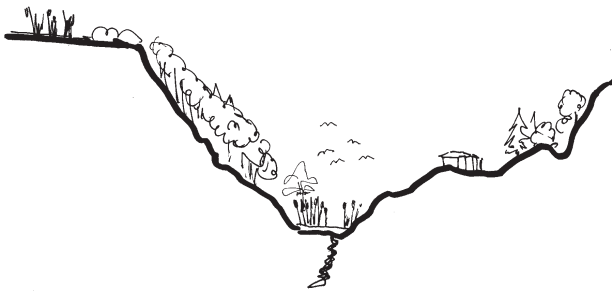
TULLY VALLEY



Tully Valley and its uplands contain the south (or east) branch of the creek. In the southern part of the valley, deep rich soil of the valley floor supports dairy farms and field crops, and in the northern part of the valley, fruit orchards and wetlands are adjacent to the creek. Valley walls are typically forested. At the southern end of the valley, the valley walls and bedrock beneath them contain fractures that resulted from the former brine well operations. North of the Valley Heads moraine, a section of the valley floor has sunk from the salt removal that occurred beneath it. The uplands of the Tully Valley have mixed use, with hill-top farms, exurban homes, patches of woodlot forest, apple orchards, and upland wetlands. Surface geologic features include the terminal glacial moraine at Tully, hills that are part of the Appalachian Plateau,

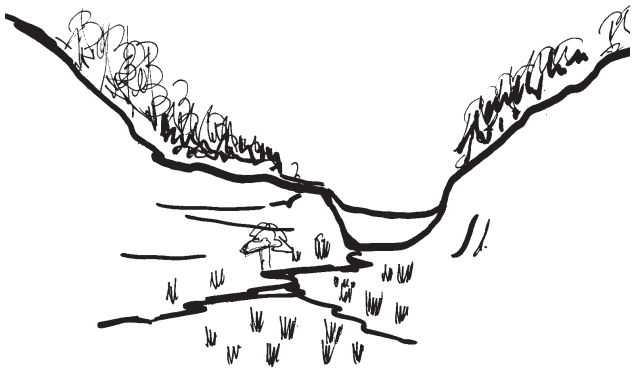
mining land subsidence across the upper Tully Valley, active landslides in the Rainbow Creek and Rattlesnake Gulf tributaries, mudboils in the valley floor near Otisco Road, and infrequent landslides along the main valley's walls. Tributary streams fall steeply from forested hanging valleys, providing the cool water, oxygenation and gravelly stream bottoms that are appropriate for trout existence and in some cases, trout spawning.

WEST BRANCH/CEDARVALE



West Branch is located in a typically narrow valley, less than a half mile wide, with two wider areas of flat bottom land. The upper of the two flats is near Tanner Road and is now largely occupied by a golf course. The lower flat land is at the junction with the east branch and is part of the flood plain upstream of the Onondaga Flood Control Dam. The whole West Branch valley is series of natural wetlands, including an open pond that supports diverse wildlife near Red Mill Road. The uplands have dairy farms, apple orchards, woods, exurban housing, and perched wetlands. The headwater is in the Pumpkin Hollow wetland. Similar to the Tully Valley, the West Branch and several of its tributary streams are appropriate for trout, with some tributaries appropriate for spawning.

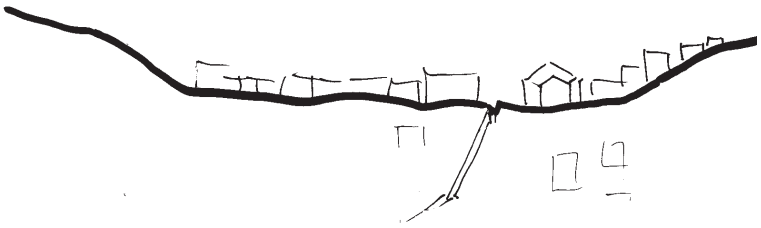
ONONDAGA NATION



Onondaga Nation is centrally located in the watershed, and includes part of the junction of the three valleys. At the nation's western boundary, west and south branches join to form the upper end of the Onondaga Valley channel. To the northeast, about a thousand feet downstream of the junction, the Onondaga Flood Control Dam is a massive structure over a quarter-mile wide with a conduit for stream flow through the east end of its base. About ten percent of the time, water accumulates behind the dam when stream flow is in excess of the conduit's capacity. A spillway for extreme flood events, located near the top of the east end of the dam, has not been used in the 57 years since completion of the dam in 1949. The dam's maximum retention basin (a constructed flood plain, made higher in elevation by the dam, and therefore more extensive than the pre-existing natural flood plain) includes the wetlands to the south and west. To the north downstream of the dam, the main channel of the creek meanders through bottom lands that include both wetlands and agriculture. Surface tributaries that join the creek inside the nation flow to it from several types of headwaters. From within the nation, springs from deep glacial sediments along the valley walls are typically sources of high quality water. Tributaries that originate outside the nation come from mixed sources of springs and upland wetlands located among suburban developments, farms and wood lots. These tributaries include Commissary Creek, Williams Creek, and Hemlock Creek, which is named Kennedy Creek upstream of the nation. The Onondaga Nation in general is more forested than the surrounding areas where agricultural fields and suburban development predominate.

Nedrow is the suburban section of Onondaga Valley and its uplands. The constructed creek channel begins in Nedrow at the southern boundary of Nedrow with the Onondaga Nation. The channel is typically widened and deepened, with several straightened sections that have grassy banks and no fencing. It is near to power lines, the inactive brine line, a former farm, a quarry and residential area. Nedrow is also part of the centrally located subwatersheds that join the creek within the Onondaga Nation.

CITY OF SYRACUSE



The City of Syracuse occupies the lowest section of Onondaga Valley and nearby uplands. The oldest part of the city, now a financial, governmental and cultural area, centers on a former wetland of the creek. To the east and west rise sloped valley walls with several carbonate-bedrock sourced natural springs[1] and tributaries located in forest "islands" among residential housing and local businesses. The City of Syracuse is on the edge of the Appalachian Plateau to the south, and the city includes the southern edge of Onondaga Lake in the edge of the Ontario Lake Plain to the north.

Before the city developed, the creek formed many meanders on the flat land, and frequently flooded the area. The creek bottom and banks have been redesigned to provide straight, smooth, and fast flow, with the capacity to contain most flows within its banks. Runoff from the cityscape is very rapid due to hard surfaces, little vegetation or soft ground, many slopes, and drains that minimize ponding. (See water quality and hydrology fact sheets)

In downtown Syracuse, with its skyscrapers, sidewalks and streets built over glacial and alluvial soils, historic creek tributaries, such as Yellow Brook in the Washington Street area, have been completely absorbed into the city sewer system. South of downtown, creek tributaries are open natural streams as they come down the slopes of the eroding escarpment of the plateau. Where the tributaries cross the valley floor towards the creek's main channel, they are covered over, and confined to culverts that pass under residential and commercial areas. An exception is the small stream from Dorwin Springs. It is exposed to light and only briefly culverted where it passes under an access road in the Kelly Brothers Memorial Park. Named surface tributaries include Kimber Brook, Cold Brook (formerly known as Peck Brook or Trout Brook), Hopper Brook (Harrison Brook), City Line Brook, and Furnace Brook. From the valley floor, the tributaries join the main creek channel via outflow pipes. With the exception of Dorwin Springs, the covered channels of tributaries receive some water from the city storm water sewers. (V. Esposito, 2006)

In the Onondaga Creek watershed, city storm runoff can bypass tributaries and reach the creek by two sewer pathways. The city storm sewers have direct outfalls to creek. Modified older combined sewers (in which storm flow mixes with sanitary sewage) discharge to the creek when high storm runoff overwhelms their capacity, typically after an inch or more of rainfall in a day.

The wide scoop shape of the lower Onondaga Valley watershed means that water from more natural tributaries on the rim of the basin may contribute an otherwise unexpected improvement in water quality (e.g. temperature) in the urban stretch of the creek main channel as it flows through Syracuse to Onondaga Lake.

1 Carbonate-bedrock springs occur in the Onondaga Creek watershed in the urban stretch, and alluvial fan springs occus in the West Branch Valley. Bands of carbonate springs extend along the west and east valley walls from Nedrow in the south to Furnace Brook/ Elmwood Park in the north. A large number of smaller springs along the western valley wall tax the storm sewers capacity in wet weather. The larger springs in this area include (from south to north) Dorwin and Kimber springs, which formerly supplied drinking water to the southern part of the City, and Hopper Brook and Furnace Brook, which are similarly spring-fed. On the east wall, Rockwell Spring, with other springs and seeps, feed the Cold Brook (Peck Brook) tributary in the Valley section of Syracuse. In the West Branch valley, springs drain alluvial sand and gravel deltas that formed during deglaciation, and these springs may also receive ground water from the carbonate (Onondaga Limestone) bedrock (Winkley 1989, Syracuse NY and G. D. Holmes 1927, Kappel 2007).

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The Onondaga Lake Partnership (OLP) sponsors the Onondaga Creek Revitalization Plan project with funds from the U.S. Environmental Protection Agency. Visit www.onlakepartners.org for more information about the OLP.

This fact sheet and additional information about the Onondaga Creek Revitalization Plan project can be found on the World Wide Web at www.esf.edu/onondagacreek/.