

# **Onondaga Creek Revitalization:**

**An Overview  
by Richard Smardon, Ph.D.**



# Contents



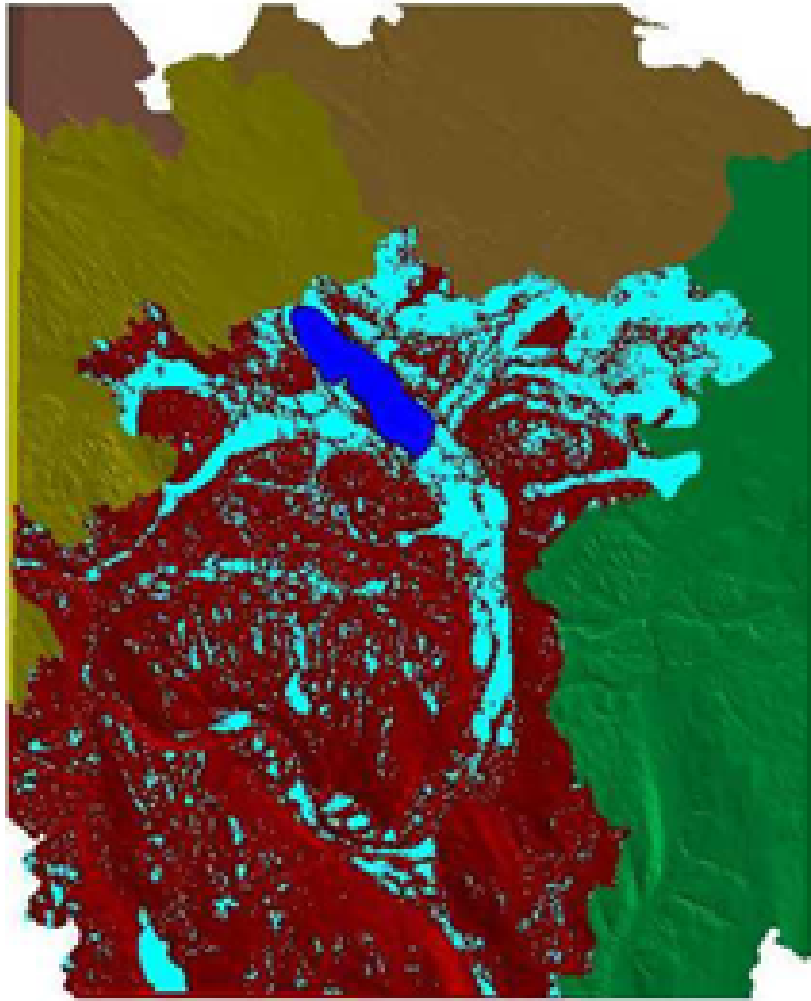
- Physiography
- Hydrology
- Land use history; south & north
- Discharge & water quality
- Physiography within the city
- Current aquatic ecology

# Onondaga Creek Physiology



- Only 111.33 sq mi but complex
- Terminal moraine w/ discontinued drainage
- Partially deranged drainage system
- Large metropolitan area which occupies an extensive portion of drainage basin
- Flood control dam which alters stream flow
- Movement of gauging station 3 times/25 yrs
- Elongate shape - 21.8 mi long by 10.2 mi wide
- Total relief is 1567 ft.- drainage divide to canal
- Slope and aspect: > 9% greater than 20 degrees - 70% = 0 to 10 degrees

# Onondaga Lake Drainage - Estimated Former Wetlands



 Onondaga Lake

 Former Wetlands

Onondaga County Drainage Basins

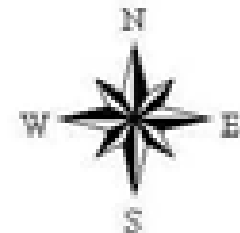
 Chittenango Creek Basin

 Lower Seneca River Basin

 Oneida River Basin

 Onondaga Lake Basin

 Oswego River Basin



# Onondaga Creek Hydrology

- Mature in stream development - topography has both youth & old age features
- Both poorly drained lowland & upland areas
- Floodplain is extensive and well drained
- Tributaries: Rattlesnake, Rainbow & Emerson Creeks are incising their valleys
- Stream divides in some portions of basin are broad & poorly defined vs other portions
- Stream meandering extensive in Tully Valley



# Onondaga Creek Discharge

- Stream flow is supplemented by springs discharging from the Tully Moraine
- Streams along the flanks of the valley (primarily Rattlesnake Gulf & Rainbow Creek)
- Springs discharging from the mudslide areas along the base of Bare Mountain
- No flow from the valley floor except mudboils or wells drilled around the mudboil area
- Urban runoff within Syracuse City limits plus 21-53 combined sewer overflows during storm events



# Cultural & Land Use History



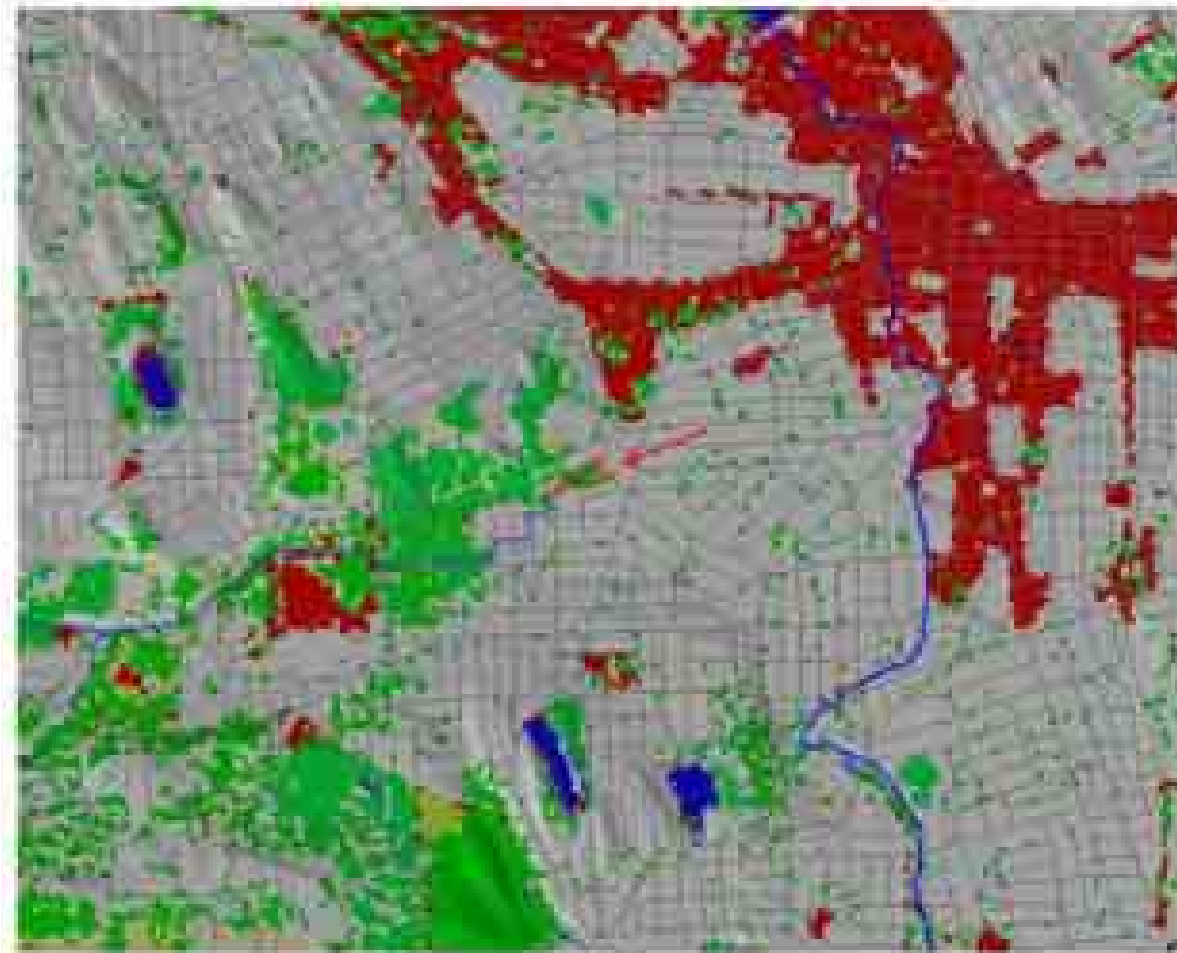
- **Native American perspective**

- Onondaga Lake to the north > peacemakers convinced five other warring nations to bury their weapons and join confederacy under the “Great Law of Peace”
- Tully lakes to the south are sacred - Peacemaker joined Onondaga Chief in sabbatical to develop important cultural practices such as use of wampum's to record historical events
- Onondaga Creek as a whole is part of the creation story for the Onondaga Nation
- Onondaga Creek traditionally was used for fish & wildlife subsistence, plants for food and medicines, water supply, for water festivals and other cultural events.

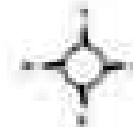
## Tracy Lake at Creek Headwaters



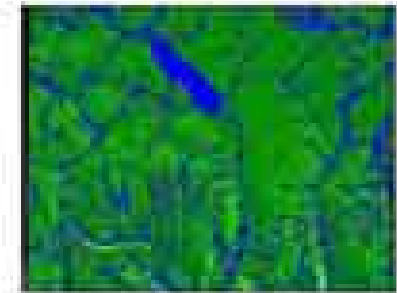
# Proposed Constructed Treatment Wetland Site at Delaware and Grand Avenues, Syracuse, NY



- Proposed Site
- Syracuse Streets
- Onondaga Hydrography
- Land Use Categories
  - Open Water
  - Low Intens. Resid.
  - High Intens. Resid.
  - Comm./Ind/Transp.
  - Quarries/Stripmines/Gravel Pits
  - Deciduous Forest
  - Evergreen Forest
  - Mixed Forest
  - Pasture/Hay
  - Row Crops
  - Urban Recr. Grass
  - Woody Wetlands
  - Emergent Wetlands



0.9 0 0.9 1.8 Miles



# Cultural & Land Use History

- **Salt mining perspective**

- Salt industry developed in mid **1800's** in West Syracuse-over exploitation of salt reserves spurred late **1880's** discovery of salt layers 1000-1400 ft. below the land surface at the southern end of Tully Valley
- Mining began in **1889** and continued until late **1980's** - 200 million tons salt removed
- To mine salt - operators injected surface water into salt layers through a series of wells -then lifted the dissolved salt(brine) to the surface
- Injection abandoned in the late **1950's** - groundwater flow into the caverns insufficient to dissolve additional salt deposits
- Up to one billion gallons of brine per year removed 150ft of salt - caused the land surface to collapse as early as **1920** - large collapses in the **1940's** plus creation of the mudboils

# Mudboils



- **Mudboil history**

- Volcano like cones of fine sand and silt that range from several feet high to several inches in width-active mudboils ebb and flow with precipitation
- Observed in the Tully valley in **1890's** - discharge of sediment causes gradual land subsidence - water discharged from mudboils is either fresh or brackish

- **Mudboil remediation**

- **1991** Onondaga Lake Management Conference identified the Tully Valley mudboils as the major source of turbidity discharged to Onondaga lake
- Remedial efforts included: **1)** diverting flow of the tributary, **2)** installing depressurized wells, **3)** constructing a dam & sediment impoundment

# Mudboil Retention Basin



# Land Slides

- **Landslide history**

- On April 27, **1993** a large landslide occurred at the foot of Bare Mountain in the Town of Lafayette - largest landslide to occur in NYS since the early 1900's
- Debris from the landslide covered 1,500 ft. of Tully Farms Rd with 15' of mud and 3 homes were destroyed

- **Causal analysis**

- Stratigraphy and hydrology of Bare Mountain hillside + greater than normal precipitation before the landform
- Previous landslides occurred about 6,100 yrs and 9,870 yrs BP near Webster Road - also increased precipitation could have been causal factors



# Cultural & Land Use History

## ● Urban history: Syracuse perspective

- 9 miles of creek within the City of Syracuse - early history along Seneca turnpike - early water mills
- City fathers concerned about floods and human waste - first sewage commission **1868** - right to use creek for sewage **1872** - dead fish in lake late **1890's**
- **1854** straightened & deepened channel - **1901/02** high flooding- **1915** flood 50% larger = property damage > led to channel deepened and straightened
- **1920** flood had minimal property damage
- **1927** recommended building dam at headwaters of creek
- **1949** Army Corps builds dam despite protests of Onondagas - placed right on top of the village site
- **1949** dangerous current in creek in the city-built fence along sides plus guard towers

# Cultural & Land Use History



- **Syracuse southside perspective**

- Syracuse, a city of 160.00 +/- is 25 sq mi in size and 13.1 sq mi including the CBD lies within the Onondaga Creek drainage. Where growth has occurred in the creek basin is in the flood plain of the creek just south of the city line commonly called the "valley" about 1,640 acres - that runs into Nedrow
- Distinct neighborhoods within the city are the southwest and Brighton neighborhoods (together called the southside) then the valley further south. The "southside" has historically suffered economic discrimination in the form of housing "redlining" and lack of voice leading up to the current controversy with the proposed RTF at Midland Avenue.

# Onondaga Creek ends at Inner Harbor & Barge Canal!



# Water Quality History

- **Syracuse's water quality history:**
  - First STP built in **1924** - two trunks paralleling Onondaga Creek - quickly out grown
  - Debate continues until **1954** about technology and site for new plant
  - Plant built and augmented in series of stages from **1956** to **1982** - Onondaga County takes over sanitary district
  - Creek conditions not changed since **1968** - weeds and trash along the banks - 21 combined sewer overflows between Ballantyne/Atlantic & Barge canal
  - **1986** Suit by ASLF against county for exceeding WQA
  - **1990** Water Resources Act created Onondaga Lake Management conference > Onondaga Lake Partnership in **2000**
  - **1998** Settlement with ASLF, state and county to implement schedule for STP improvements plus RTF's for CSO bacteria treatment along creek

# Onondaga Creek at Dorwin Avenue



# Current Water Quality

- **Onondaga Creek chemical water quality 1998**
  - Specific conductance (measure of dissolved solids) range from 500 to 600 microsiemens/cm upstream - but downstream from mudflats > 1400uS/cm - lowered slightly at Rattlesnake/Rainbow Creeks - then increase to 2000uS/cm downstream from 1993 landslide area - then to 2,250 from northernmost landslide area
  - Oxygen concentration constant 7 to 7.92 mg/L- but 6mg/L at mud boil tributary at 10/US20
  - Ph varied only slightly along the creek 8.4 to 8.6 units but 7.5 at mudboils
  - Chemical concentrations stable along the creek except sodium chloride (halite salt) and calcium sulfate (gypsum) at mud boil discharges
  - Water quality relatively good from dam to just north of Seneca turnpike
  - Downstream CSO coliform counts and sediment spike after each storm event

## CSO location plus debris at creek crossing



# Current Aquatic Health



- **Fish survey (1968)**

- Several species of trout & smaller native fish species: suckers, cubs & dace - ten species - # species range from 4 to 8 - most sites dominated by 2/3 species
- Uppermost 3 mile - poor habitat for cold water species - low gradient, warm water, habitat quality - but tributaries are better in for brook trout
- Brown trout naturalized- out compete brook trout in main channel

- **Macroinvertebrate survey (1968)**

- Invertebrate density generally decreased downstream w/midges being most common followed by stonefly, mayfly, true fly, beetle, caddisfly and worms

# Onondaga Creek Summary



- Very diverse from a physiological perspective
- First 6 miles of headwaters has mudboils, landslides > sediment and salt issues
- Next 12 miles has hydrology altered by a dam and channelization near the city
- Last 9 miles are channelized and heavily impacted by CSO flows during storm events

# Source Material

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- USGS. 2000. Salt production in Syracuse, NY(the salt city) and the hydrogeology of the Onondaga Creek Valley. USGS fact sheet FS 139-00, 8pp.