FEASIBILITY STUDY OF MUDBOIL MITIGATION ALTERNATIVES: SETTLING BASINS, CONSTRUCTED WETLANDS, AND CREEK RELOCATION, IN THE UPPER ONONDAGA CREEK WATERSHED (TULLY VALLEY, NY)

A PROJECT FUNDED BY USEPA & NYSDEC through CNYRPDB via: MUDBOIL TECHNICAL ADVISORY GROUP

September 15, 2021



Background

- The Mudboil Feasibility Study (MBFS)
- proposed by Onondaga Environmental Institute (OEI) to evaluate feasibility of three conceptual alternatives identified in prior study, Mudboil Alternatives Analysis (MBAA).
- The MBAA identified and assessed conceptual options to address and mitigate discharge of mudboil sediments released to Upper Onondaga Creek.

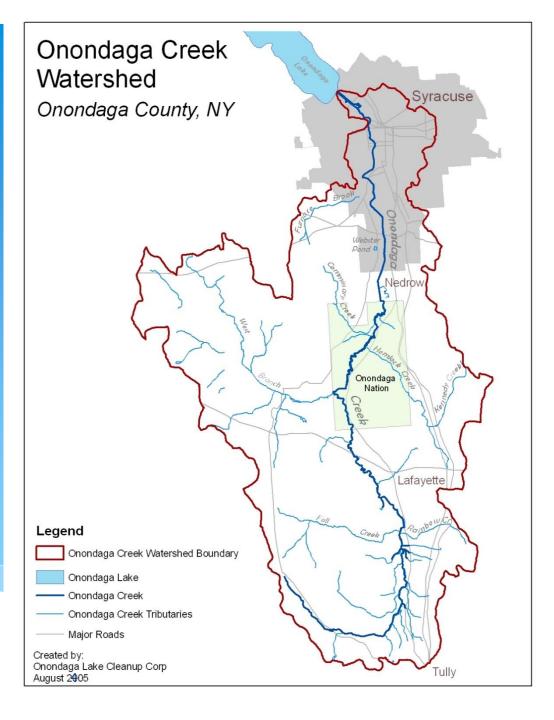


Upper Onondaga Creek

- Multiple problems,
- Regionally unique in character and habitat,
- Capable of supporting brook and brown trout fish populations, & a potential affluvial salmon run
- Important resource in establishment of cold and cool water fisheries in Onondaga Lake
- of profound cultural and spiritual significance to Onondaga Nation



Onondaga Creek Watershed





What is a mudboil?

- Volcano-like cones of fine sediment caused by artesian pressure that pushes groundwater to the surface
- Discharges fine sediment and varying degrees of saline waters into Onondaga Creek
- Discharge can occur several days to several years (Kappel 2014, OEI 2010)



Tully Valley Mudboils





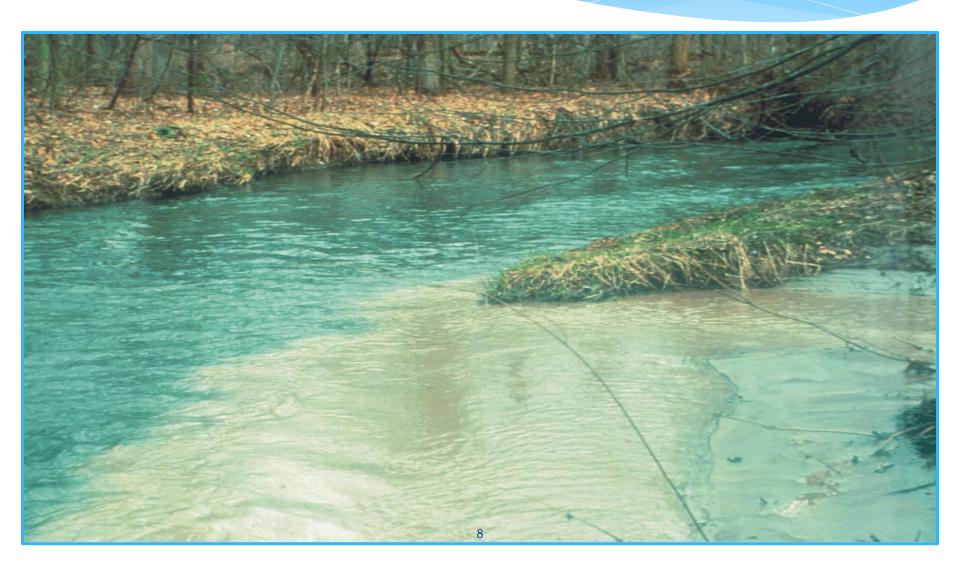


Land subsidence in Mudboil Depression Area



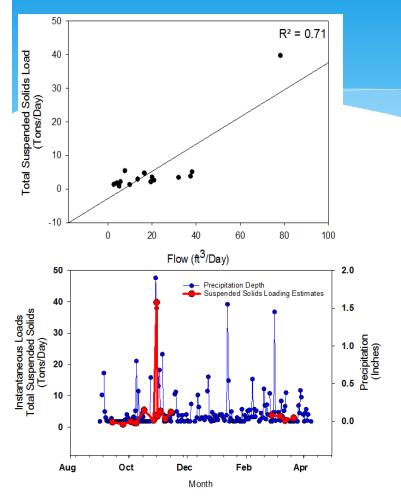


Mudboil Loading to Onondaga Creek



Onondaga Creek Sediment Loading to Onondaga Lake





Mudboil Sediment Loading

- Otisco Rd: August 2017 March 2018
- Loading Estimates (tons/day):
 - Minimum = 0.90
 - Average = 5.18
 - Maximum = 39.80
- Increases in precipitation generally correspond with an increase in sediment loads



What do mudboils discharge, besides 'mud'?



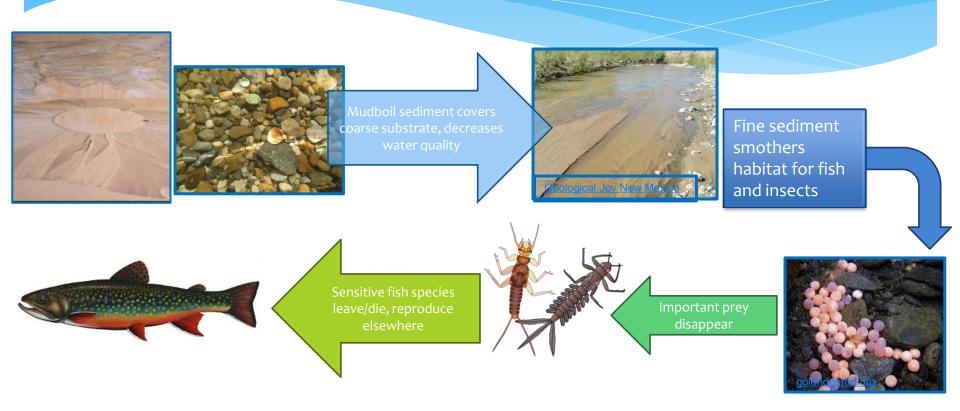
Mud:

 Total Suspended Solids = particles suspended in water (visible)

Salts:

- Total Dissolved Solids = particles dissolved in water (minerals, salts, metals; not visible)
- Conductivity = ability for water to pass electrical current
 - Particles in water
 - More particles > conductivity
 - Salts are a large contributor to conductivity
- Salinity = amount of dissolved salts in water

Impacts to Biota





Mudboil Technical Advisory Group (TAG)

- * The TAG is comprised of:
- Representatives of the Onondaga Nation,
- 2. Region 2 of U.S. Environmental Protection Agency (USEPA),
- 3. U.S Geological Survey (USGS),
- New York State Department of Environmental Conservation (NYSDEC),
- 5. New York State Office of the Attorney General (NYSAG),
- 6. Central New York Regional Planning and Development Board (CNYRPDB),
- 7. Onondaga County, and
- 8. City of Syracuse.

Project Team

Design team includes engineers, scientists, and restoration specialists from private, academic, and agency organizations consisting of:

- 1. Donald Lake, P.E. of Dulac Engineering,
- 2. Jock Conyngham, Principal at River Research and Restoration LLC,
- 3. Kyle Thomas, P.E. of Natural Systems Engineering, PLLC,
- 4. Tim Seeler, P.E. of Seeler Engineers,
- Theodore Endreny, Ph.D. P.E. of the College of Environmental Science and Forestry ,
- 6. John Williams, M.S. USGS,
- 7. Paul Hessig, M.S. USGS,
- 8. Ed Michalenko, Ph.D. of Ogl.



Three Selected Alternatives:

- 1. Alternative 1: Offline settling with postsettling polishing wetlands;
- 2. Alternative 2: Creek relocation with at-source settling;
- 3. Alternative 3: Inline settling with at-source settling



FS Goals

To identify an alternative capable of accomplishing the two overarching goals:

- 1. mitigate sediment and saline discharges to Onondaga Creek, and
- 2. restore in-stream brook trout habitat



Objectives

The selected mudboil mitigation measure(s) should:

- 1. significantly reduce sediment and salinity inputs into Onondaga Creek,
- 2. enhance the natural system's ecological integrity and resiliency,
- 3. restore habitat for fish and wildlife,
- 4. reconnect and/or restore spawning, nursery, and thermal refugia for recreational and culturally important fish species such as brook trout, and
- 5. improve water quality and remove all of Onondaga Creek from the NYS 303(d) list of impaired waterbodies for environmental degradation due to turbidity



PHASE 1. PRELIMINARY DESIGNS

STEP 1. LANDOWNER PARTICIPATION	Task 1.1 Landowner identification and contact	Task 1.2 Introductory group meeting	Task 1.3 Single property owner meetings	Task 1.4 Access agreements	Task 1.5 Site implications				
STEP 2. WATERSHED ASSESSMENT	Task 2.1 Site reconnaissa nce	Task 2.2 Project drainage area	Task 2.3 Percent impervious cover	Task 2.4 Current and projected future land use	Task 2.5 Basemap	Task 2.6 Digital elevation Model (DEM)			
STEP 3: HYDRAULIC AND HYDROLOGIC ASSESSMENT	Task 3.1 Data review	Task 3.2 Field data collection	Task 3.3 Hydrologic calculations	Task 3.4: Hydraulic Calculations		(DLIVI)			
STEP 4. GEOMORPHIC ASSESSMENT	Task 4.1 Data review	Task 4.2 Field data collection	Task 4.3 Geomorphic calculations	Task 4.4 Modeling					
STEP 5. HYDROGEOLOGIC ASSESSMENT	Infared	Multichannel Analysis of Surface Waves (MASW)	Horizontal-to- Vertical Spectral Resonance (HVSR)	Transient Electromagnetic (TEM)	Frequency Domain Electromagnetic (FDEM)				
STEP 6. PRELIMINARY DESIGN ITERATIONS	Task 6.1. Conceptual design verification	Task 6.2. Site selection	Task 6.3 Alternative verification	Task 6.4. Design configuratio ns	Task 6.5: Preliminary designs				
STEP 7. DETAILED PRELIMINARY DESIGNS	Task 7.1. Administrati ve plan outline	Task 7.2. Vegetative plan outline	Task 7.3. Operation and maintenance (O&M) plan outline		COST	Task 7.6. Tentative schedule	Interim F	lask / X	Task 7.9. Interim FS report modification
STEP 8. PUBLIC OUTREACH AND PROJECT SELECTION	Task 8.1. Public comment solicitation	Task 8.2. Public outreach forums	Task 8.3. Public input analysis	Task 8.4. Project selection	Task 8.5. Second interim FS report				
STEP 9. PUBLIC OUTREACH, PROJECT ACCEPTANCE OR REJECTION	Task 9.1. Public comment solicitation	Task 9.2. Public outreach forums	Task 9.3. Site tours	Task 9.4. Public input analysis	Task 9.5. Project finalization	Task 9.6. Final interim FS report			

The End Questions?



Tully Valley Mudboils Historical Timeline

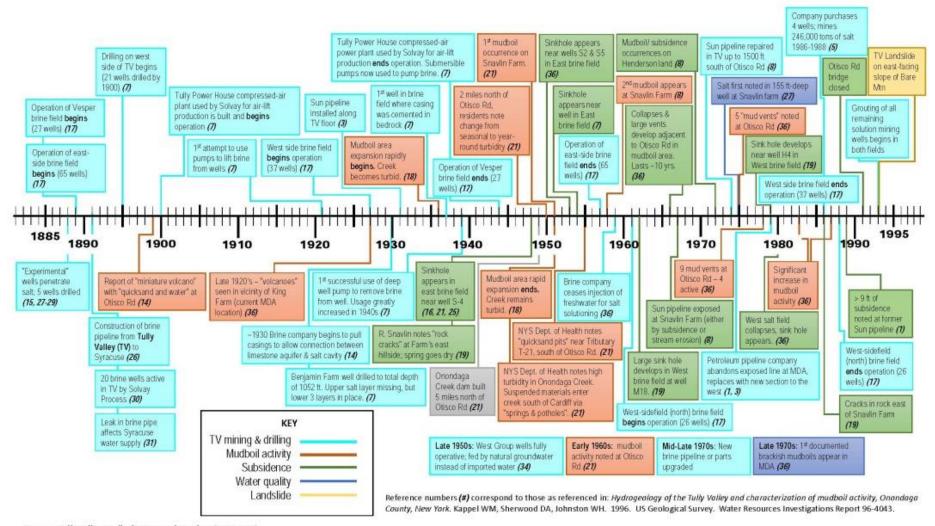


Figure 1. Tully Valley Mudboils Historical Timeline (1885-1995)

