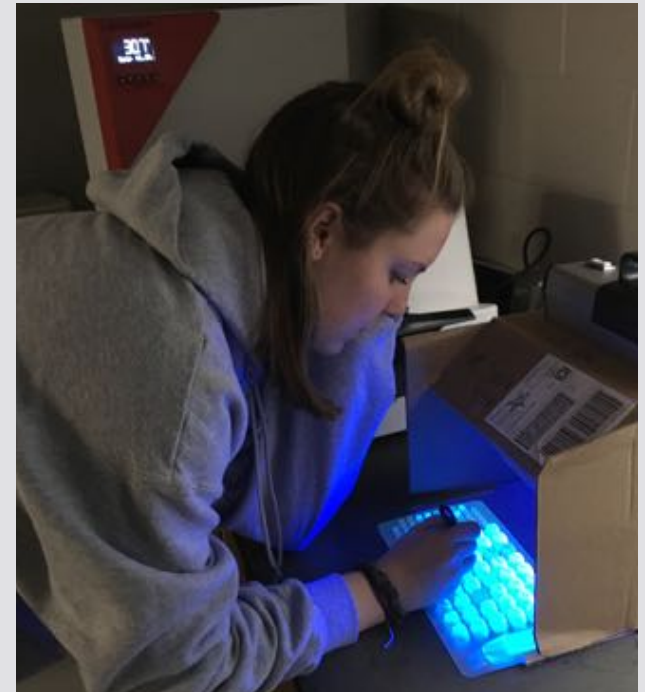


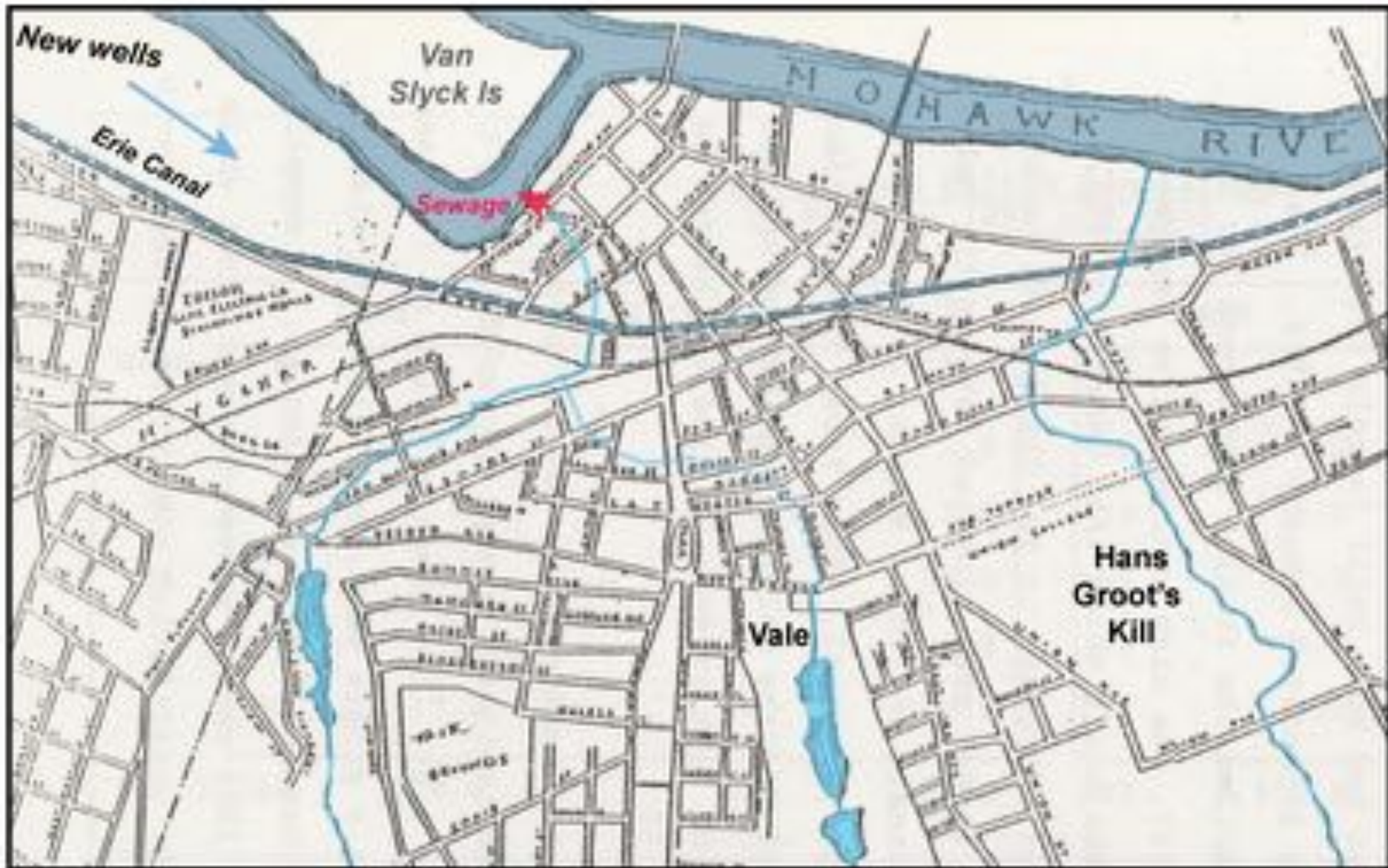
The Mohawk River in a time of change: threats to surface water and drinking water





Garver, Notes from a Watershed (2021)

Great Flats Aquifer (Groundwater) - 1897



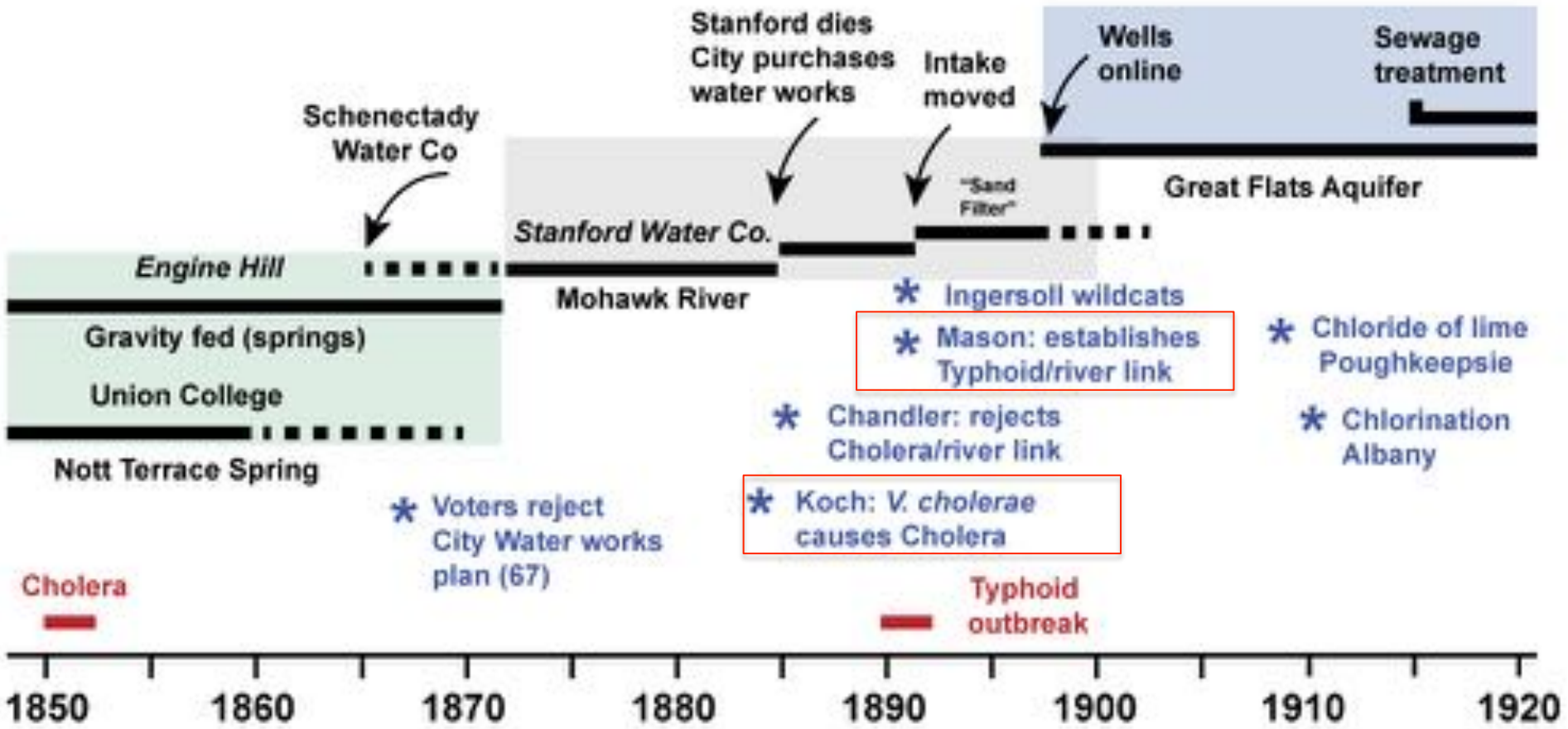
Base Map. G. Marlette (1899)

Schenectady Water Supply (1850-1920)

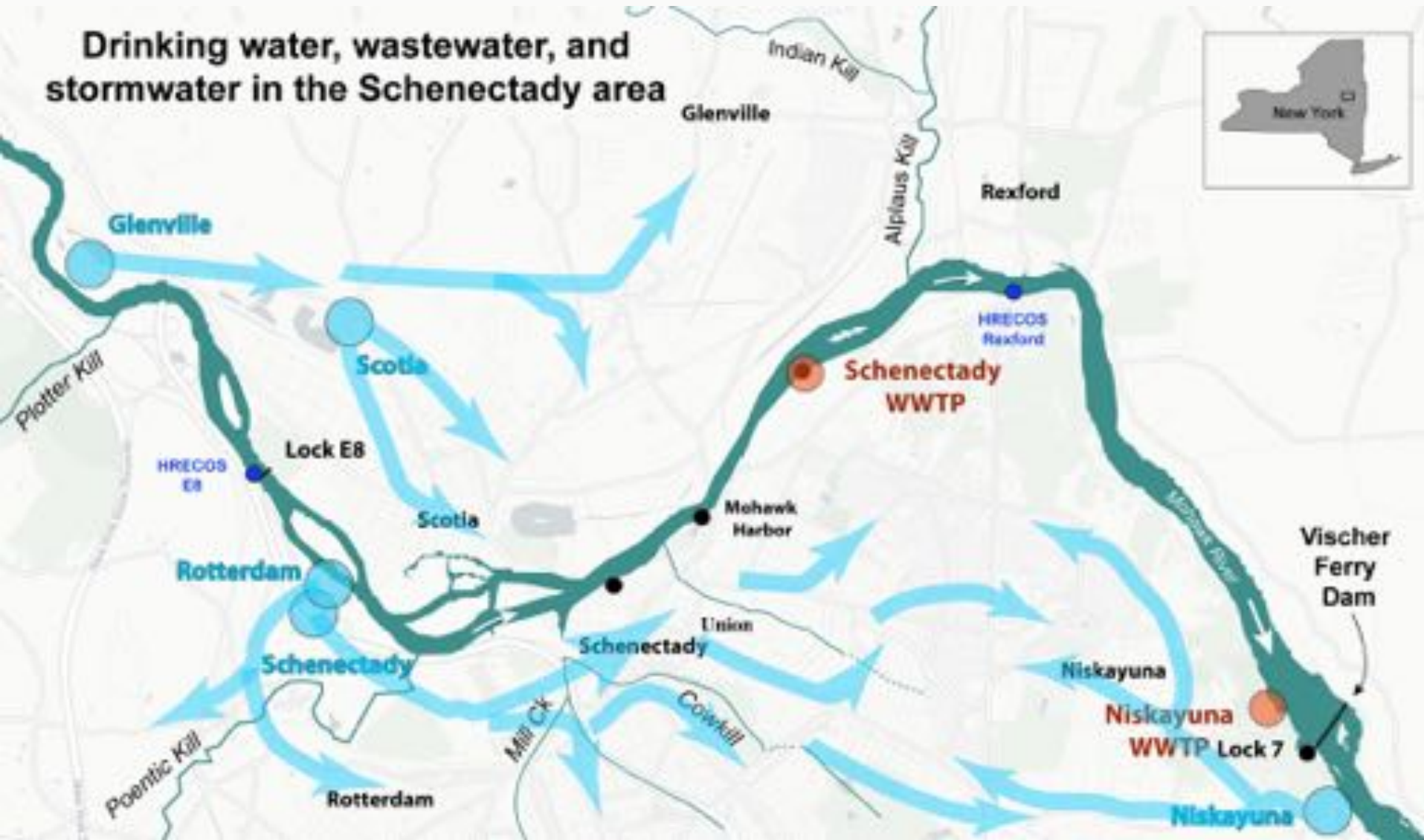
Springs/creeks

Mohawk River

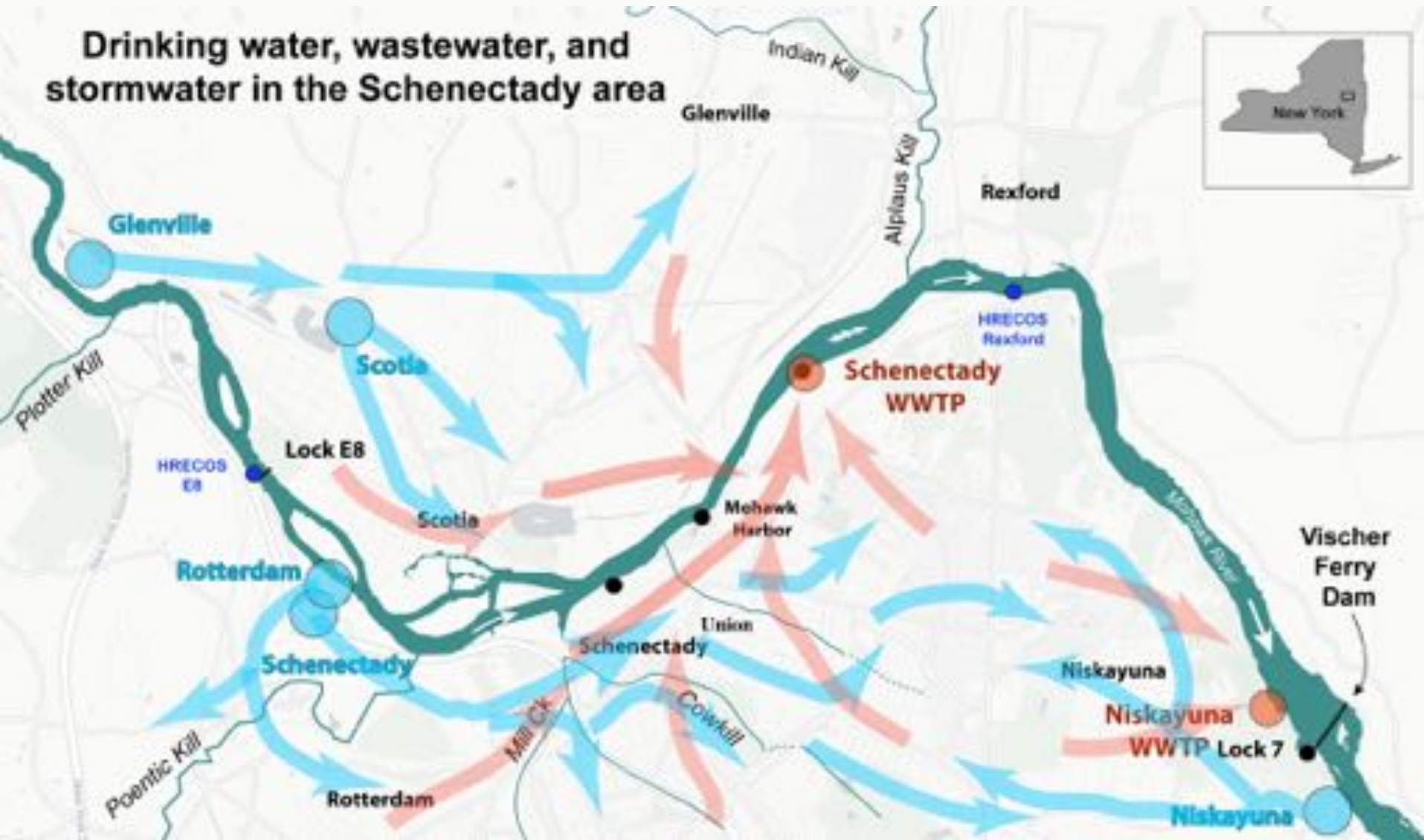
Groundwater



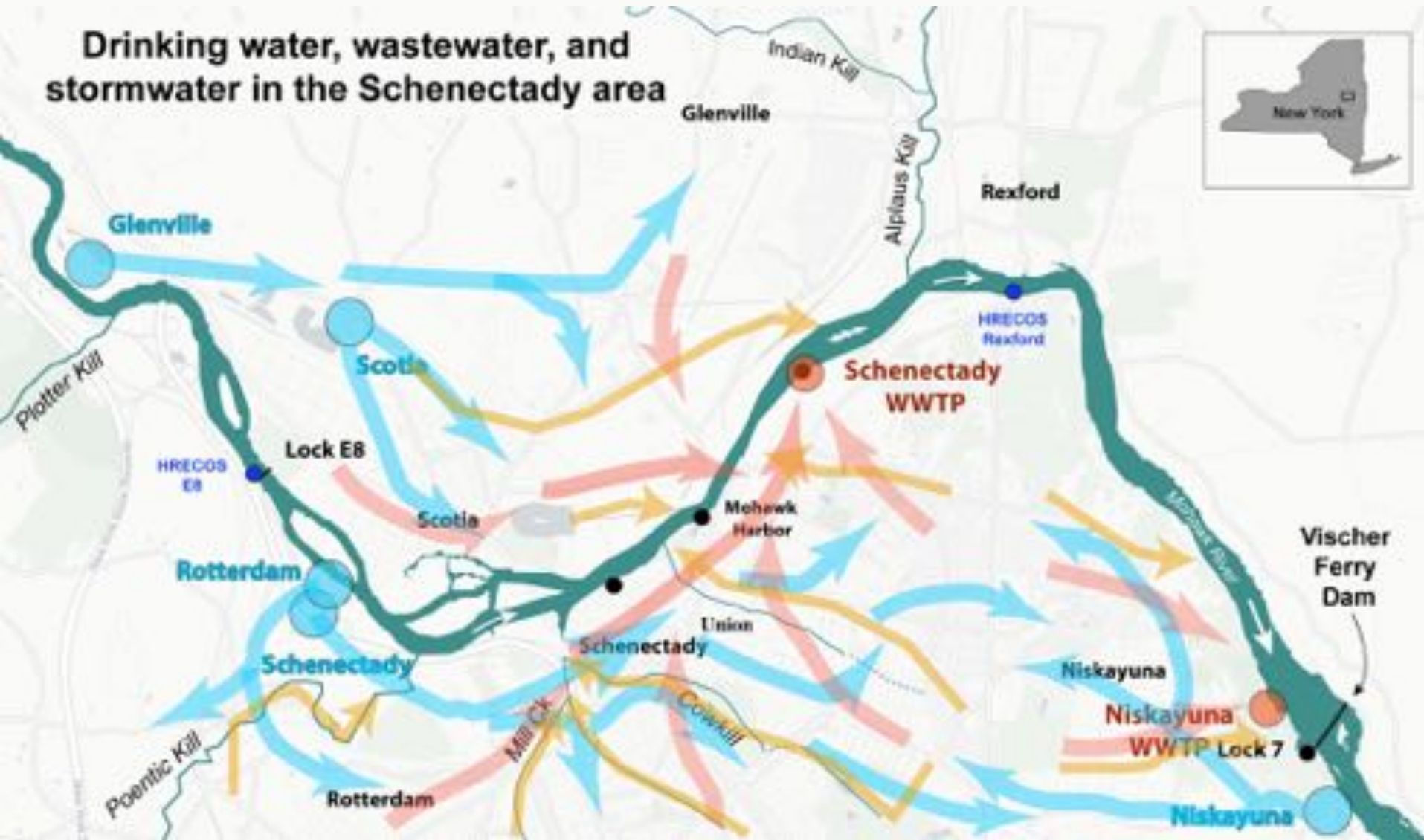
Drinking water, wastewater, and stormwater in the Schenectady area



Drinking water, wastewater, and stormwater in the Schenectady area



Drinking water, wastewater, and stormwater in the Schenectady area



Safe Drinking Water Act

1974
1986
1996

Municipal drinking water systems

Water quality standards (MCL, MCLG)

Ground water used as drinking water

PFAS
2023?

Safe drinking water

Clean Water Act

1972
1977
1987

Wastewater Discharges

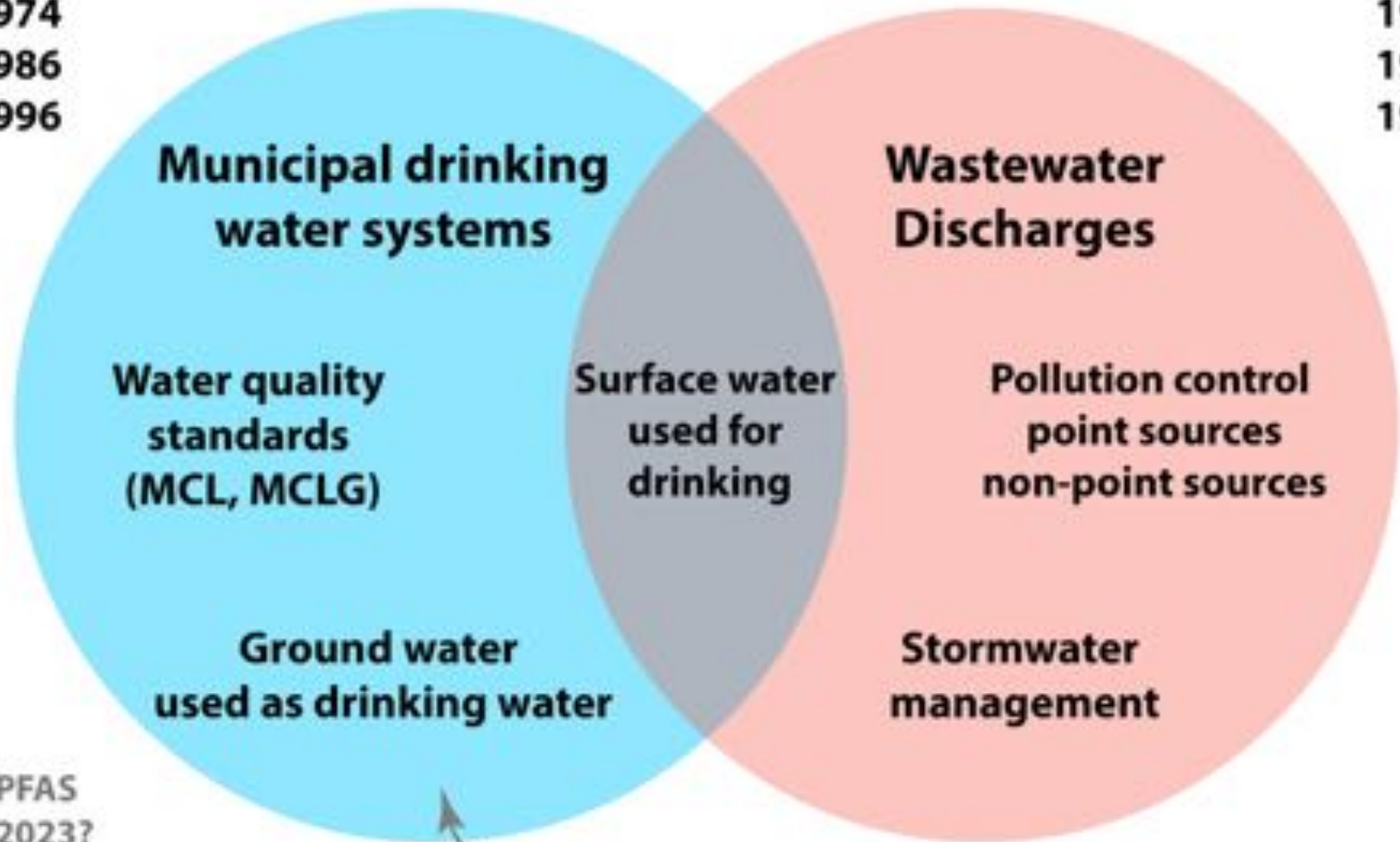
Pollution control point sources non-point sources

Stormwater management

Fish, Drink, Swim

Surface water used for drinking

Lead Copper Rule (LCR)
1991, 2011, 2021





Sewage in our streams

26 October 2021 Enterococcus: >96,784 mpn/100 ml

Jl Garver, Union College

Sewage in our streams and rivers

Bacteria

Total Coliforms
Fecal Coliforms
→ *Escherichia coli*
Fecal Streptococci
Salmonella spp
Shigella spp
→ *Enterococci*
etc.

Viruses

Enterovirus
Norovirus

Parasites

Cryptosporidium spp.
Giardia Lamblia



Enterococcus sp.
Fecal indicator bacteria

Sewage in our streams and rivers



IDEXX system



Enterococcus sp.
Fecal indicator bacteria

Sewage in our streams and rivers



NY State DEC uses

- Total coliforms
- Fecal coliforms
- *E. coli*

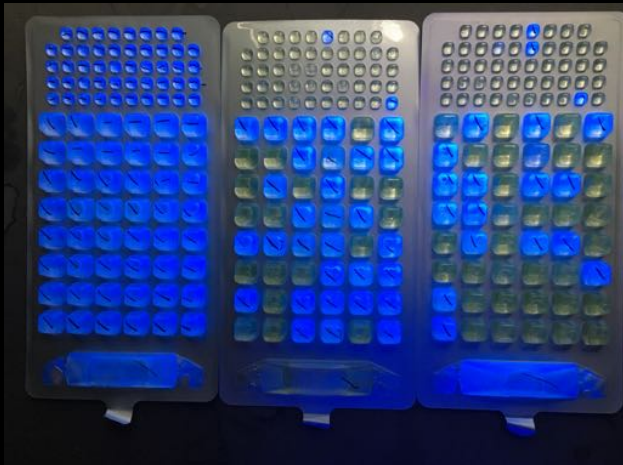
US EPA

- *E. coli*
- *Enterococcus*

Beach Action Value

60 mpn/100 grab

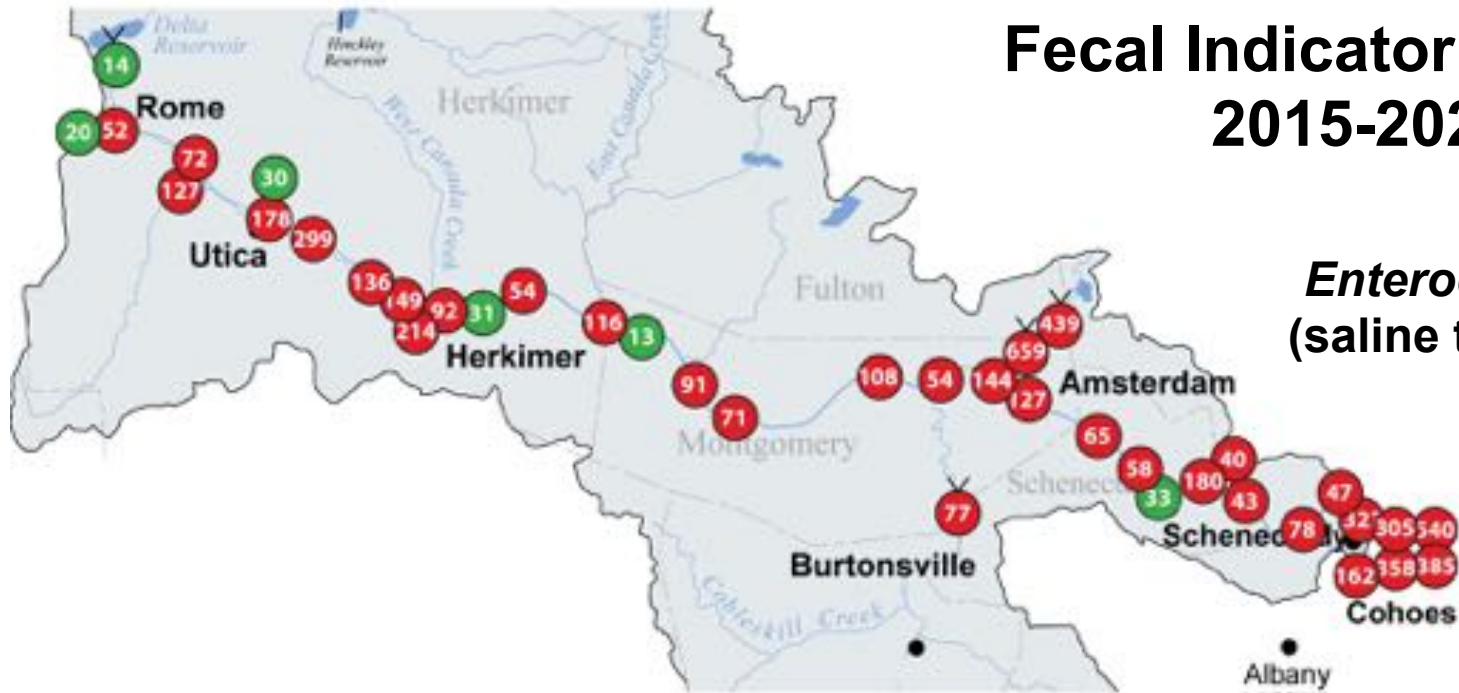
30 mpn for GeoMean



Enterococcus sp.

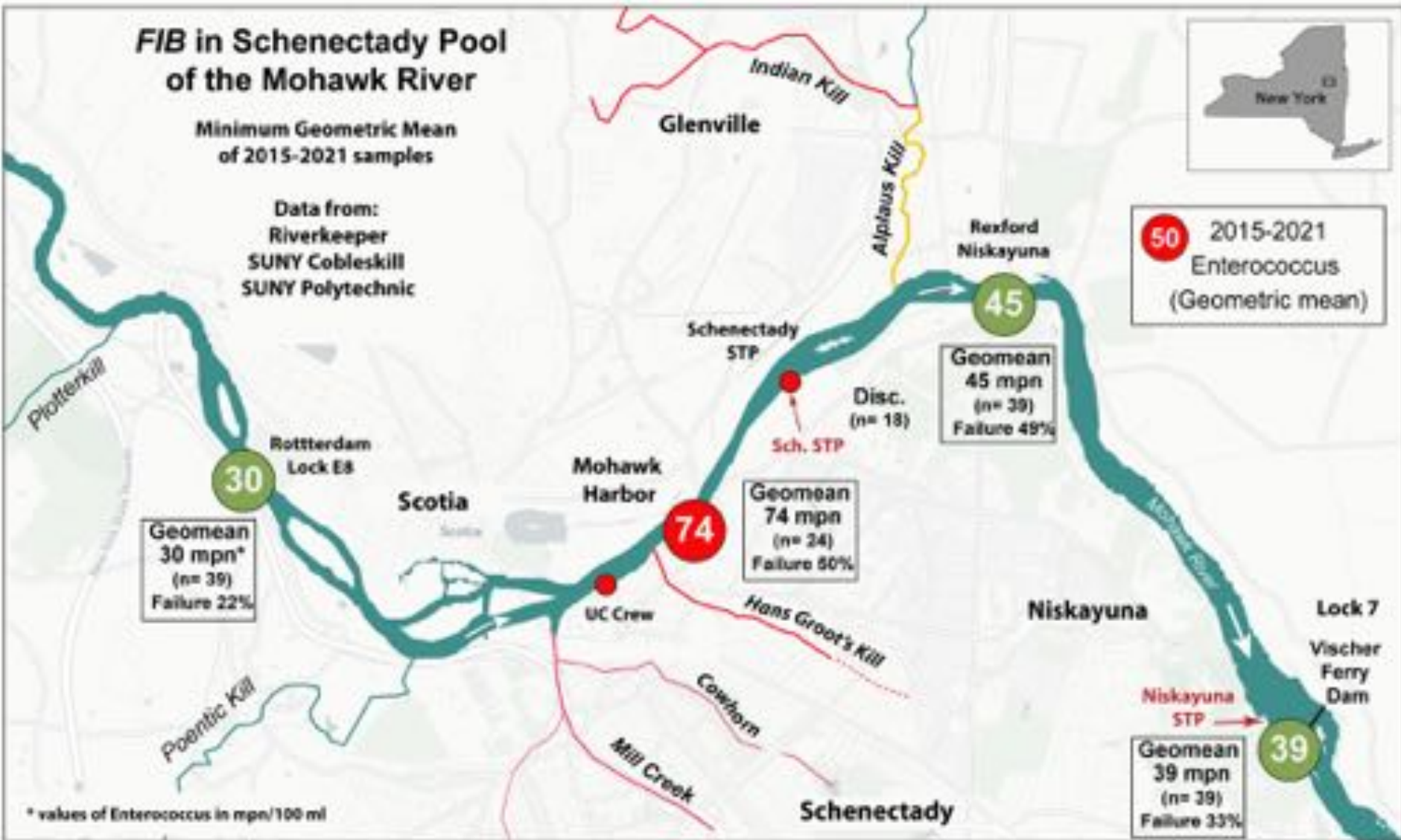
Fecal indicator bacteria

Fecal Indicator Bacteria 2015-2022

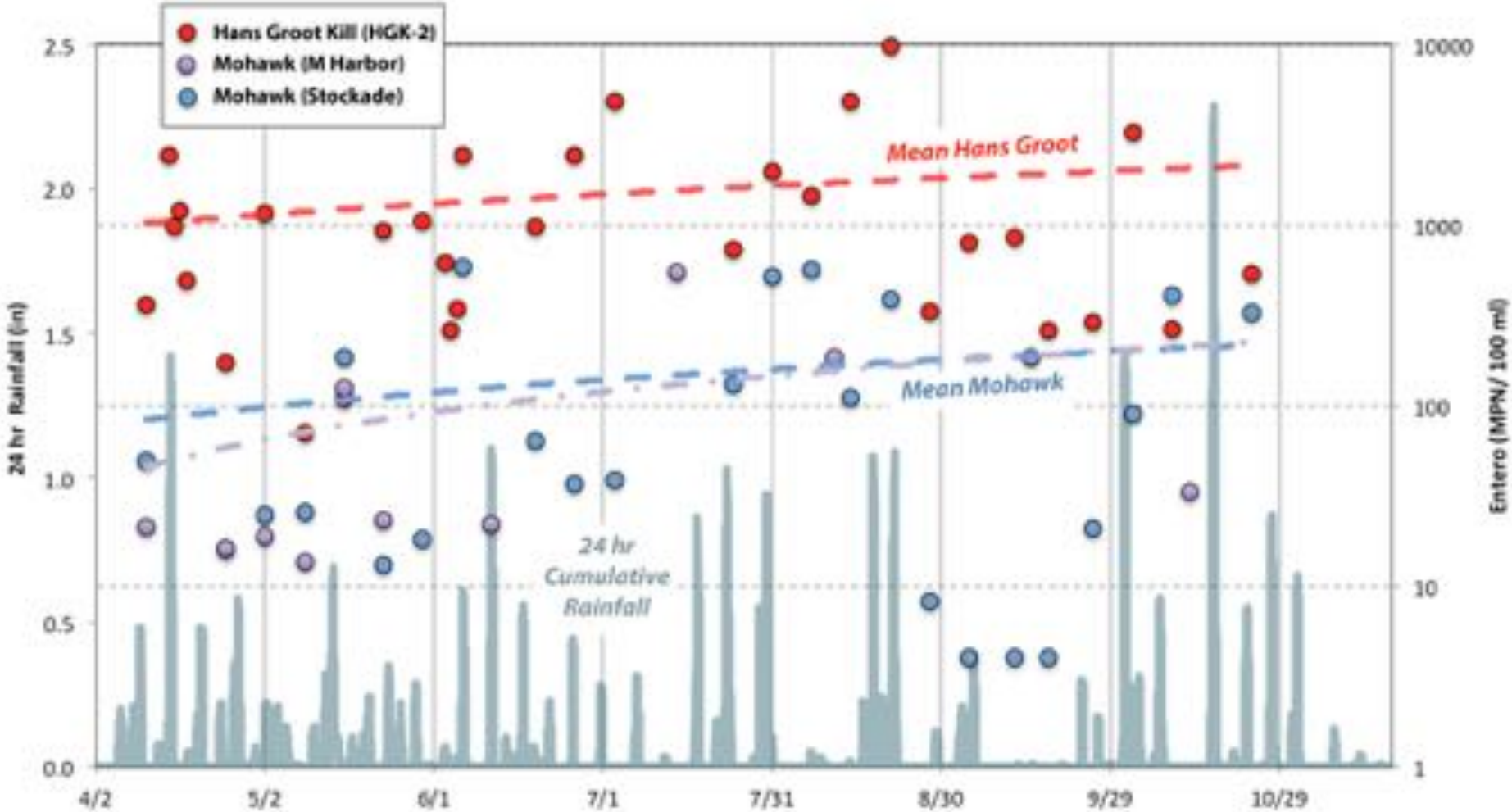


Riverkeeper and academic partners
(SUNY Cobleskill, SUNY Poly)
(Law et al., 2023)

Sewage in our streams and rivers

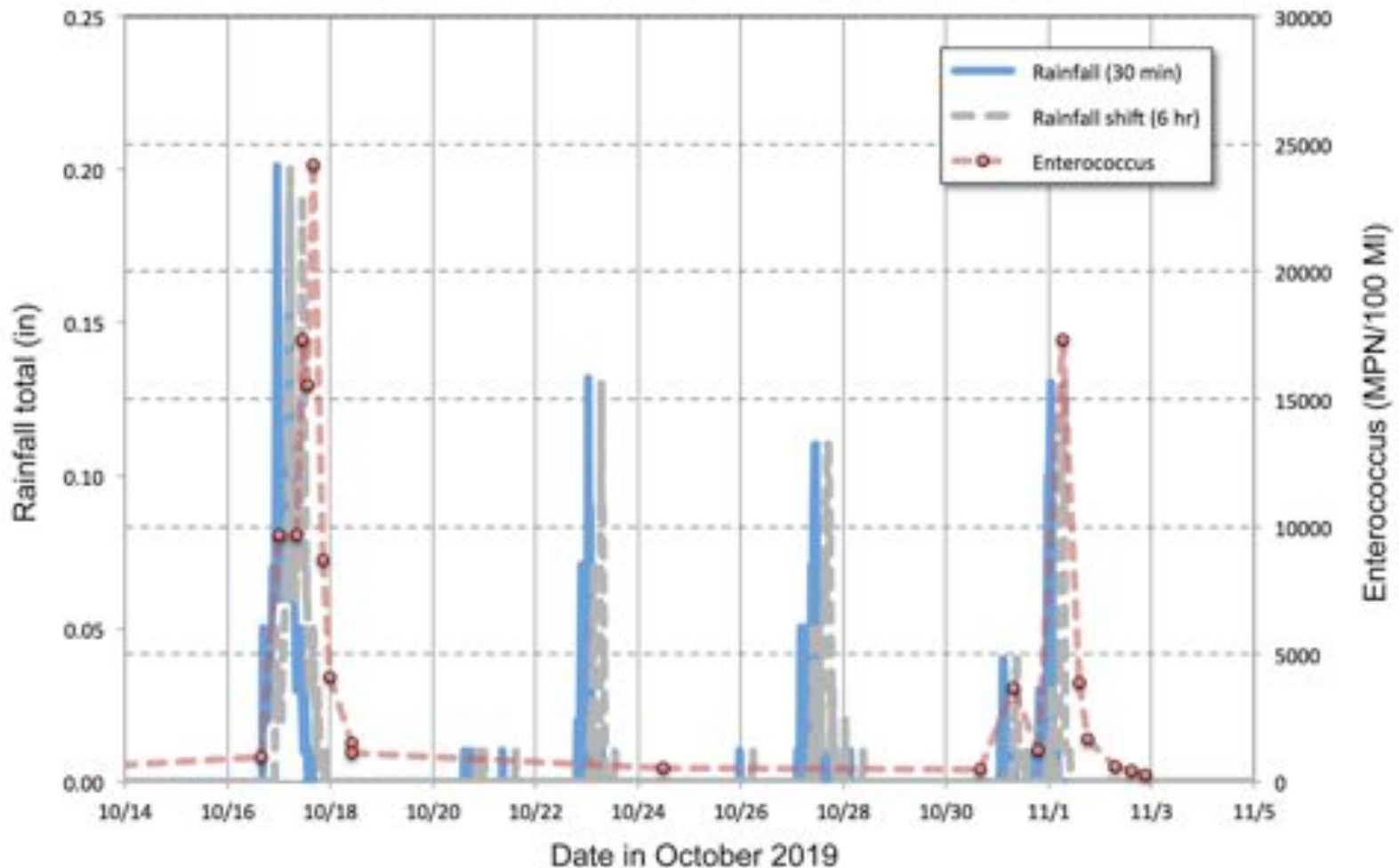


Sewage in our streams and rivers



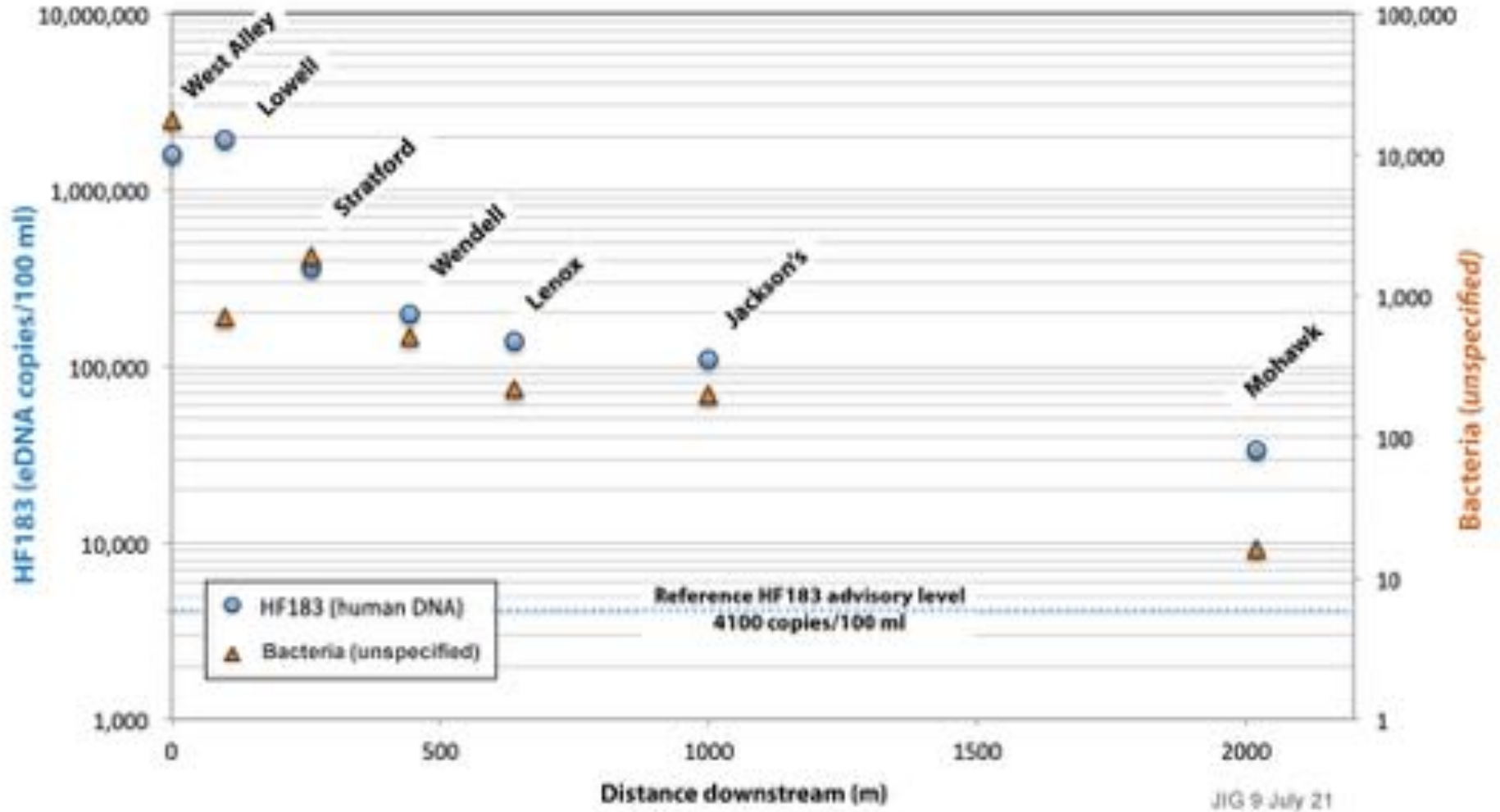
Sewage in our streams and rivers

Rainfall and *Enterococcus* in HGK (October-November 2019):
Entero levels spike during rainstorms



FIB in Hans Groot's Kill is human sewage

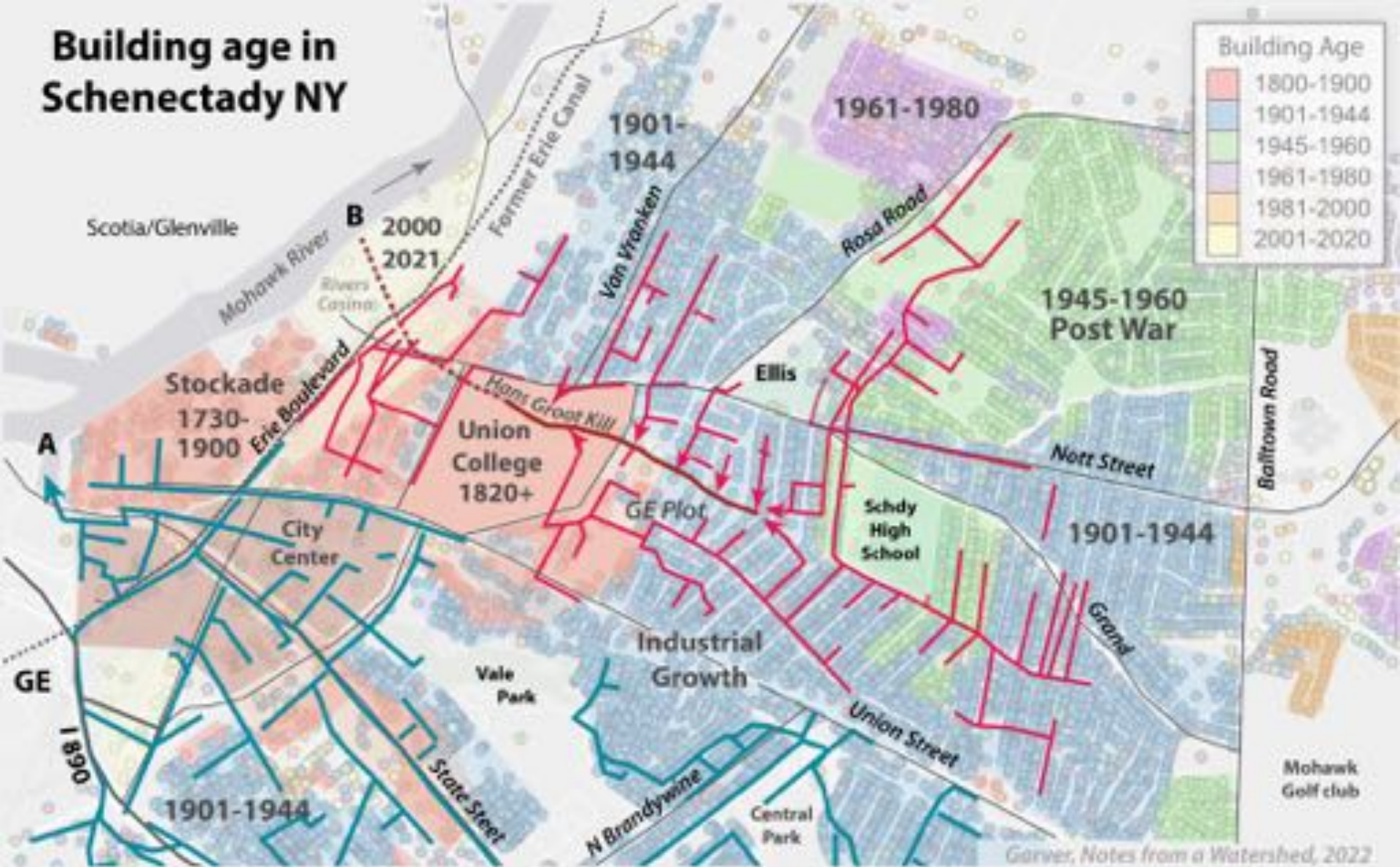
Sewage indicators in the Hans Groot's Kill (Schenectady)



Data: City of Schenectady

Sewage in our streams and rivers

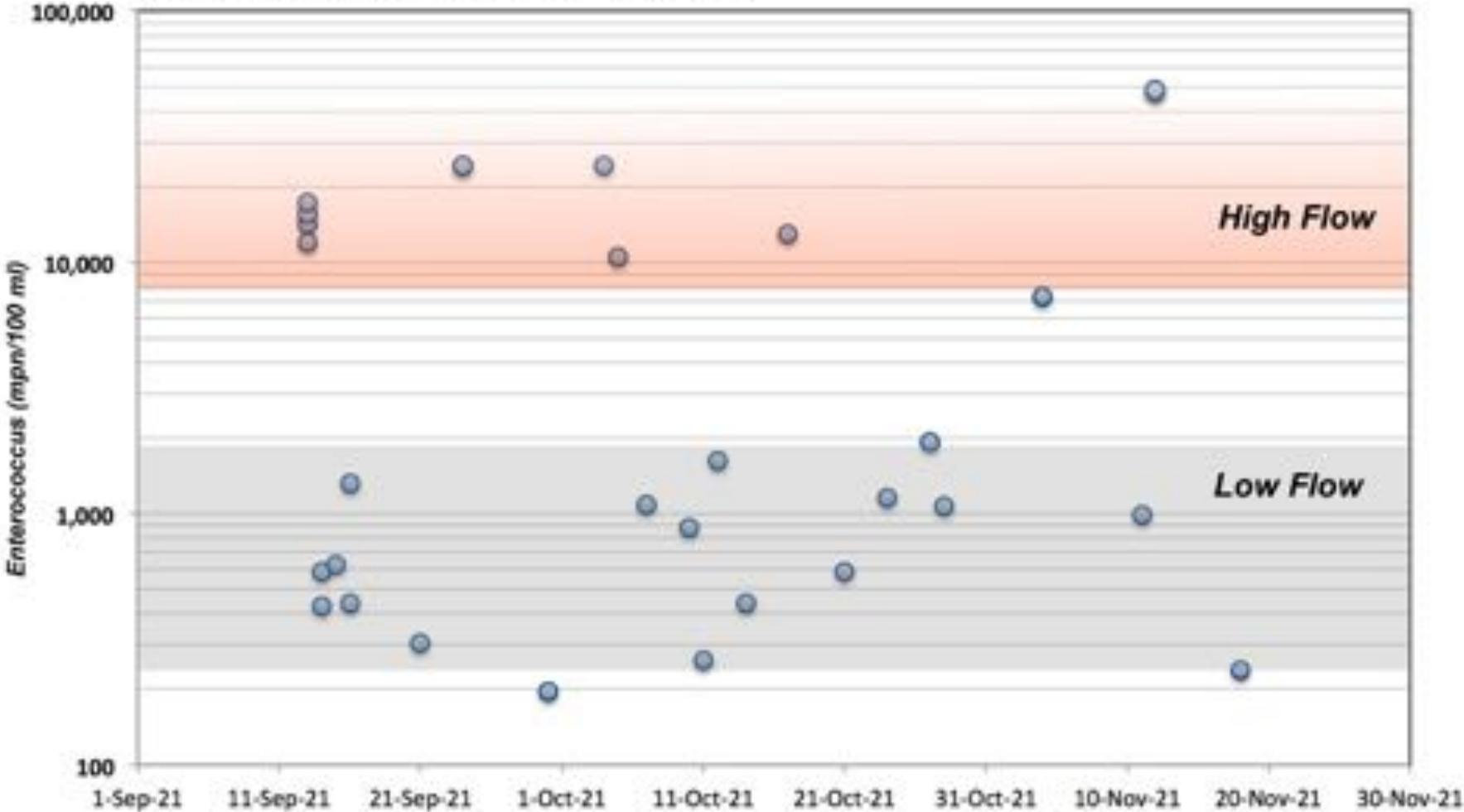
Building age in Schenectady NY



Garver, Notes from a Watershed, 2022

Sewage in our streams and rivers

FIB in the Hans Groot Kill - Fall 2021



Sewage in our streams and rivers



Overwhelmed sanitary sewer on the Union College Campus in Schenectady NY
on 24 September, 2021

Sewage in our streams and rivers

Concordiensis

THE STUDENT NEWSPAPER OF UNION COLLEGE SINCE 1877

Volume. CXLIV, Issue XX

Thursday, October 7, 2021

concordiensis.com

Union's delphic waters polluted by sewer overflow

By Michael Rosenbaum
News Editor

The brook that bounds through Union's grounds has found itself polluted with the city of

Concord's tertiary sewer, which transports wastewater from houses to sewage treatment plants, and a second system, implemented in 2007, was designed to catch rainwater. Public records related to the upkeep of the storm sewer are available

clear that the Hans Groot Kill suffers from contamination worse than the overflow of one sewer. The Kill is likely contaminated from the city's sewage. Enterococcus, a type of fecal indicator bacteria, is present in the Kill at levels significantly



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Gastrointestinal illness floods Union student body

By Ryan Cudworth
Contributing Writer

For many students, knowledge of Union's recent gastrointestinal outbreak came to light on October 10, 2021 when an email from Union's Chabad was sent out to participants of the previous Friday's mega-shabbat, an

While we don't yet know the cause, it is possible that the fish we sourced for the sushi social may have been contaminated. We have been in touch with administration and informed them of the situation.

However, it quickly became apparent that this was far more than a simple case of food poisoning. The Union College Parents Facebook

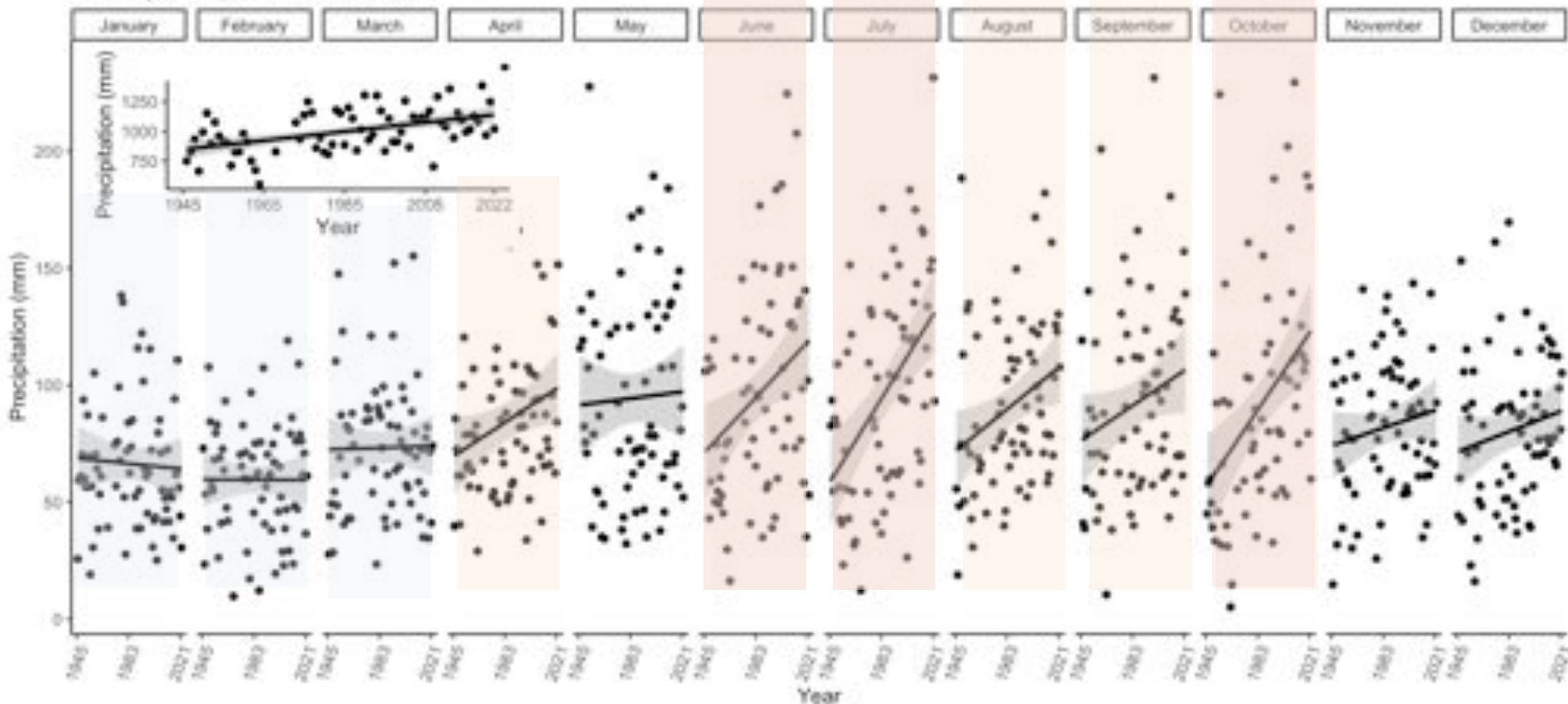
leased a statement the evening of October 11 to the student body. A similar email to alumni of the college was released an hour later. The Parents Facebook group was also forwarded an email from the school around this time. The email to the alumni asserted that the college was unaware of a particular source of the outbreak, but denied that it was tied to the Chabad



Sewage in our streams and rivers

Mean monthly Precipitation in the Mohawk Watershed

Monthly Precipitation 1945-2022



June to October

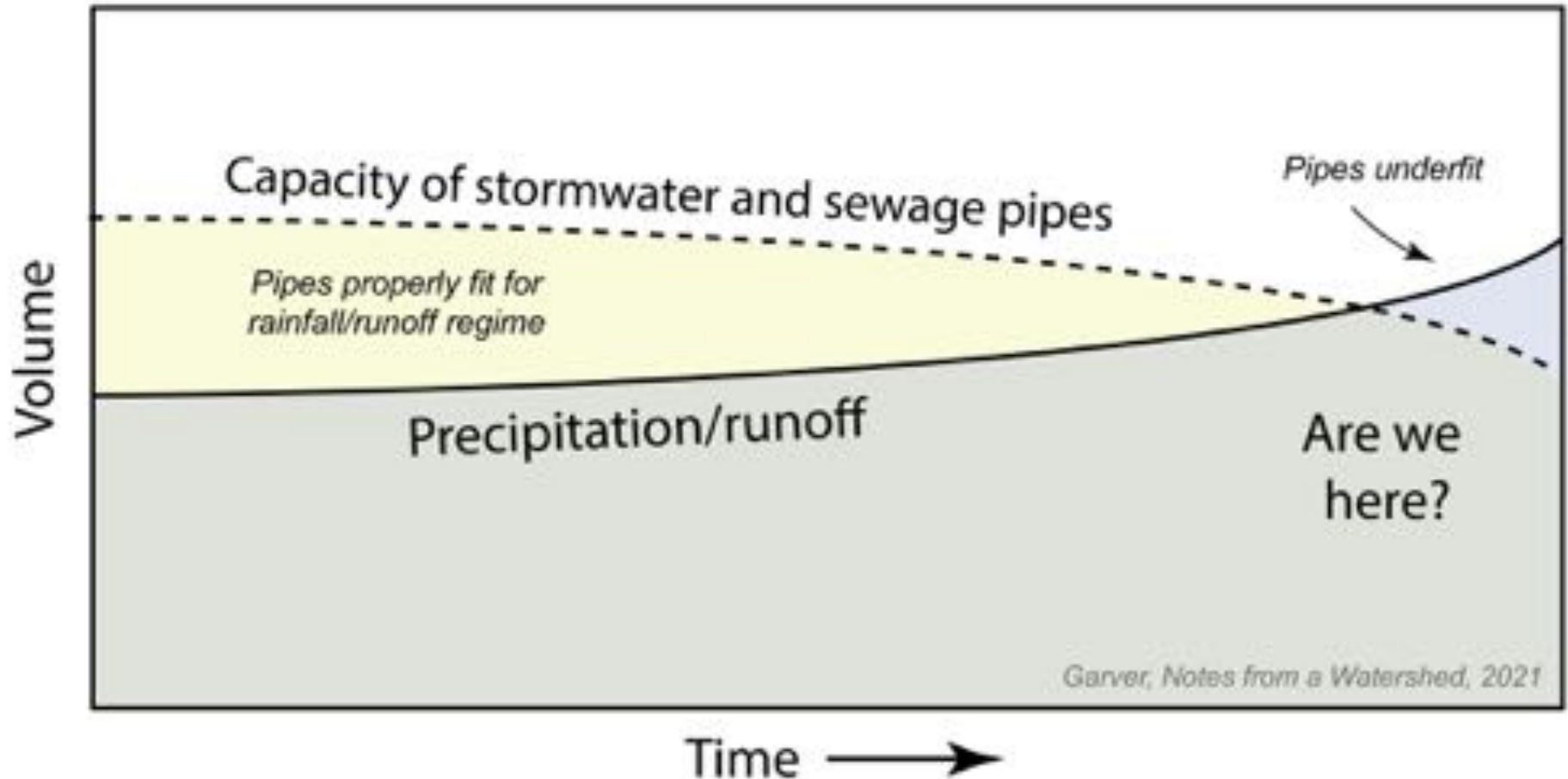
Source: GSOD Stations

Integrated data from nine stations in watershed

Plummer and Garver, 2023

Sewage in our streams and rivers

Our aging pipes cannot handle increased precipitation
...especially extreme events



Much of the fecal load in the Schenectady pool is driven by impaired infrastructure

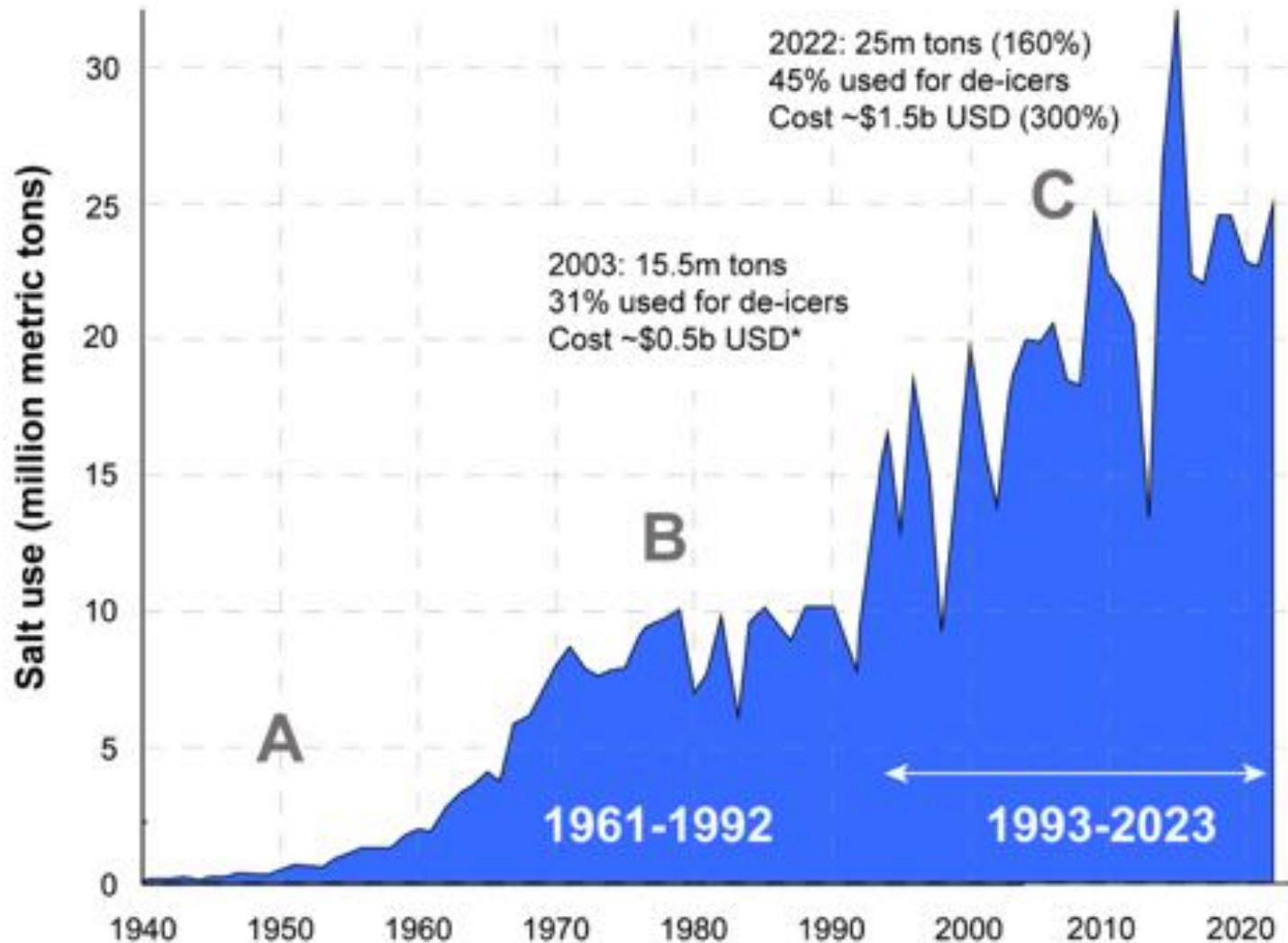
Garver, "Extreme rainfall in the Northeast" Notes from a watershed, 2021



Salinization of our drinking water

Salinization of our drinking water

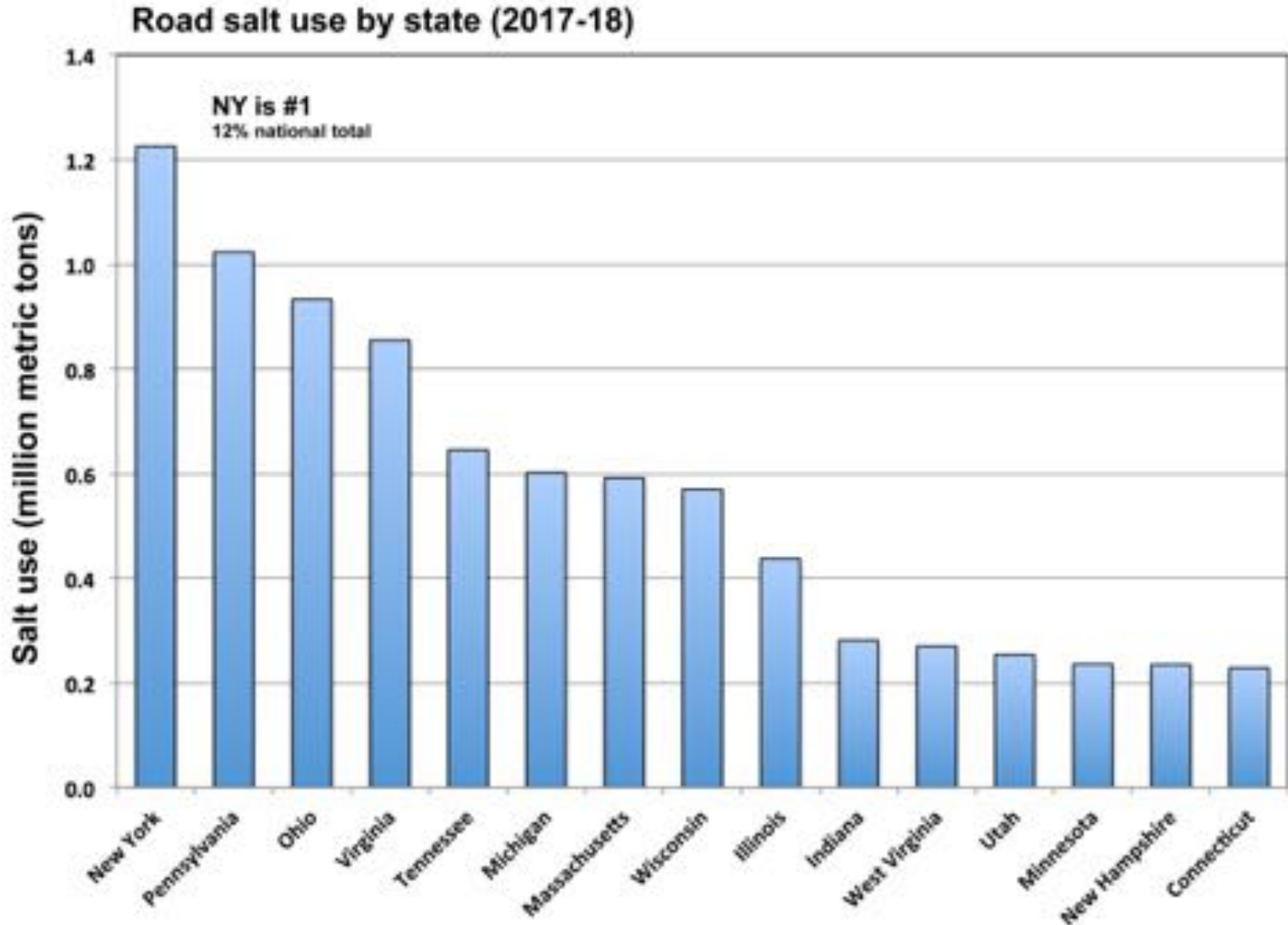
US domestic use of Rock Salt (NaCl) for deicing



Modified: Jackson & Jobbágy, 2005 (pre-1971); USGS mineral inventories 2003-2022; Matos and D.S. Kostick USGS compilation 1971-2003 * inflation adjusted (to 2023)

Jl Garver, 2023
Notes from a Watershed

Salinization of our drinking water



Data: USA Today compilation

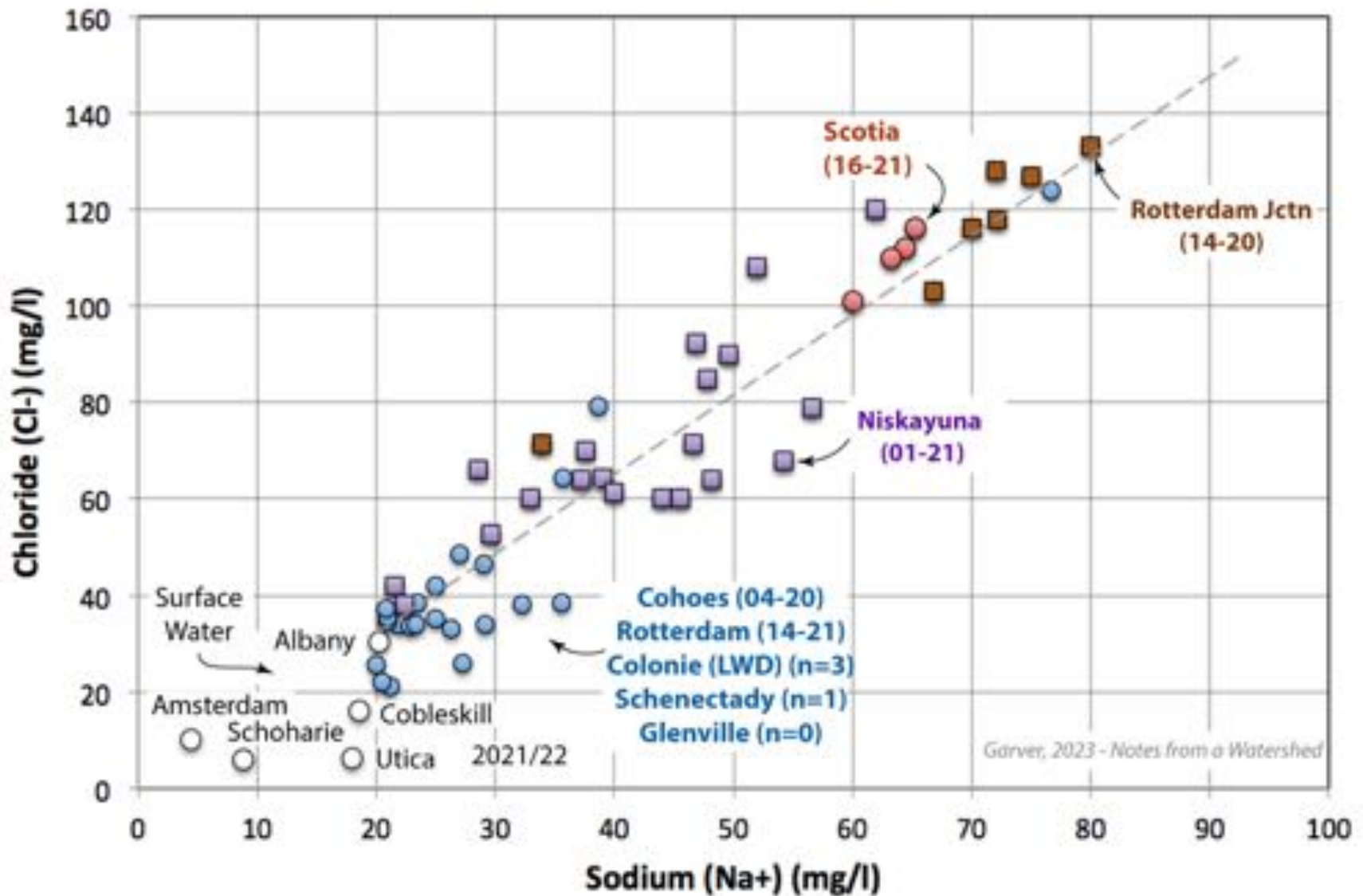
Jl Garver, 2023



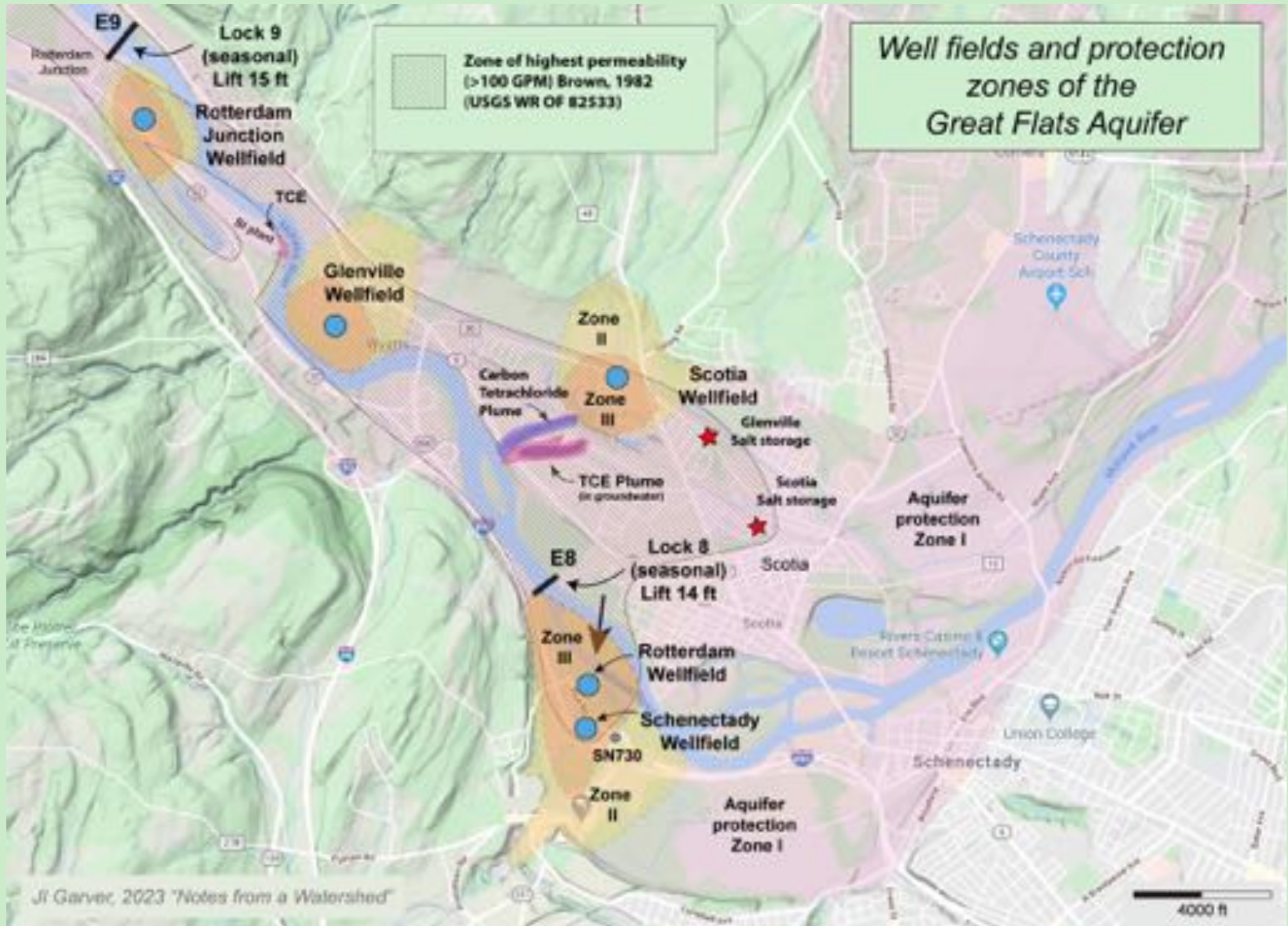


Salinization of our drinking water

Reported Na and Cl in Mohawk-proximal municipal water

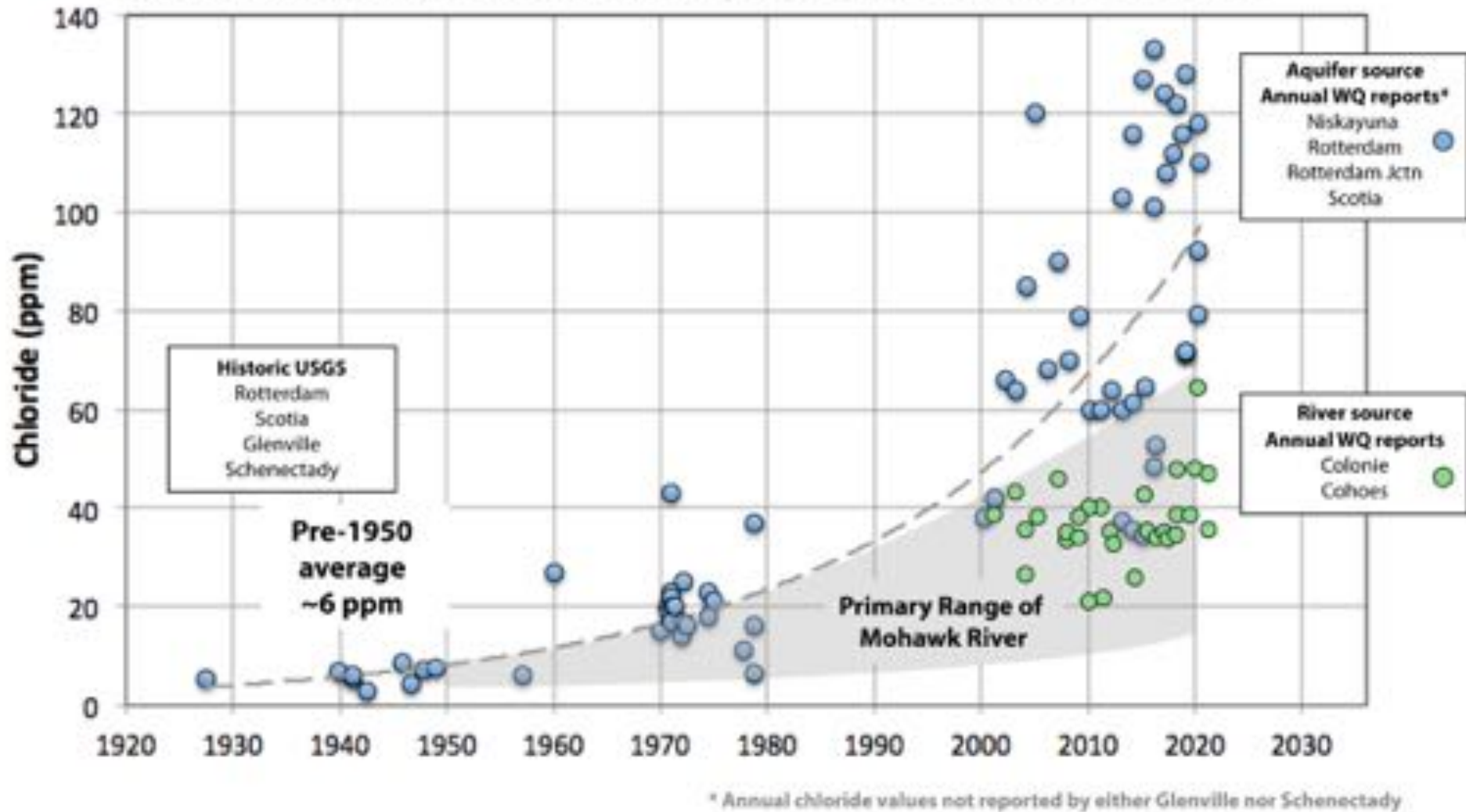


Salinization of our drinking water



Salinization of our drinking water

Chloride in municipal water: Great Flats aquifer and Mohawk River source



Storage issues

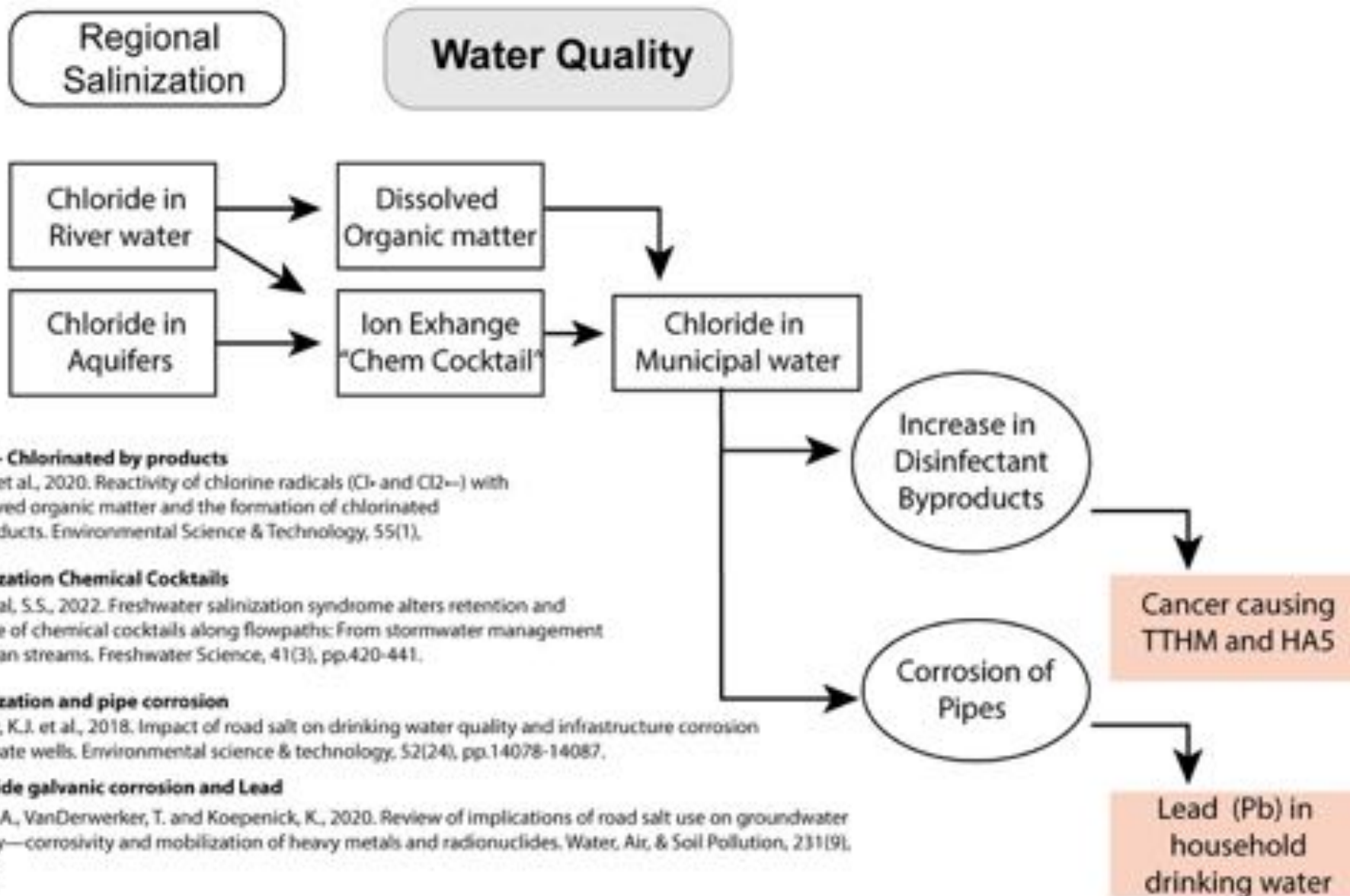


**Town of Glenville Salt (and sand) Storage:
Groundwater disaster**

Jl Garver, Notes from a Watershed, 2020



Salinization of our drinking water



Salinization of our drinking water

Water quality improvement plans discussed during Scotia board meeting

by Briana Supardi Thursday, December 15th 2022 WRGB News

SCOTIA, N.Y. (WRGB) — Solutions to address water quality concerns in Scotia were presented during a village board meeting Wednesday night. An engineer hired by the village laid out the plans before village trustees.

Dec 2022

Last month, Scotia officials found elevated levels of lead in water samples, prompting the village to expand its testing.

Engineer Douglas Cole says that they're currently conducting a study looking into adding an additive to the water to reduce corrosion in the pipes, which will prevent lead from leaching into the water.

What can you do?

Surface Water Quality

- Write McCarthy/Tedisco/Santabarbara tell them that it is unacceptable that sewage is flowing into the Mohawk
- Support *Riverkeeper* and those on the front lines doing water quality testing. “Adopt a site” for \$250/yr

Drinking water

- Read your annual water quality statement
- Test your well
- If you live in Scotia, get involved

What can ECOS do?

- 1) Focus on water quality in the Mohawk and tributaries, and press local elected officials for infrastructure repairs.**
- 2) Advocate for local and regional solutions to oversalting to stem environmental harm from salinization.**
- 3) Advance knowledge and education on the Great Flats Aquifer and other municipal water supplies.**

Focus on youth education and awareness

Notes from a Watershed

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Salinization in the Mohawk Watershed

Road salt contamination in the Great Flats Aquifer threatens public health

JOHN GARVER APR 9 2

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Aquatic pathway between the Mohawk and Lake Champlain

Aquatic invaders are using the Erie Canal to get into Lake Champlain

JOHN GARVER SEP 13, 2022 2 1