



IAWWTF

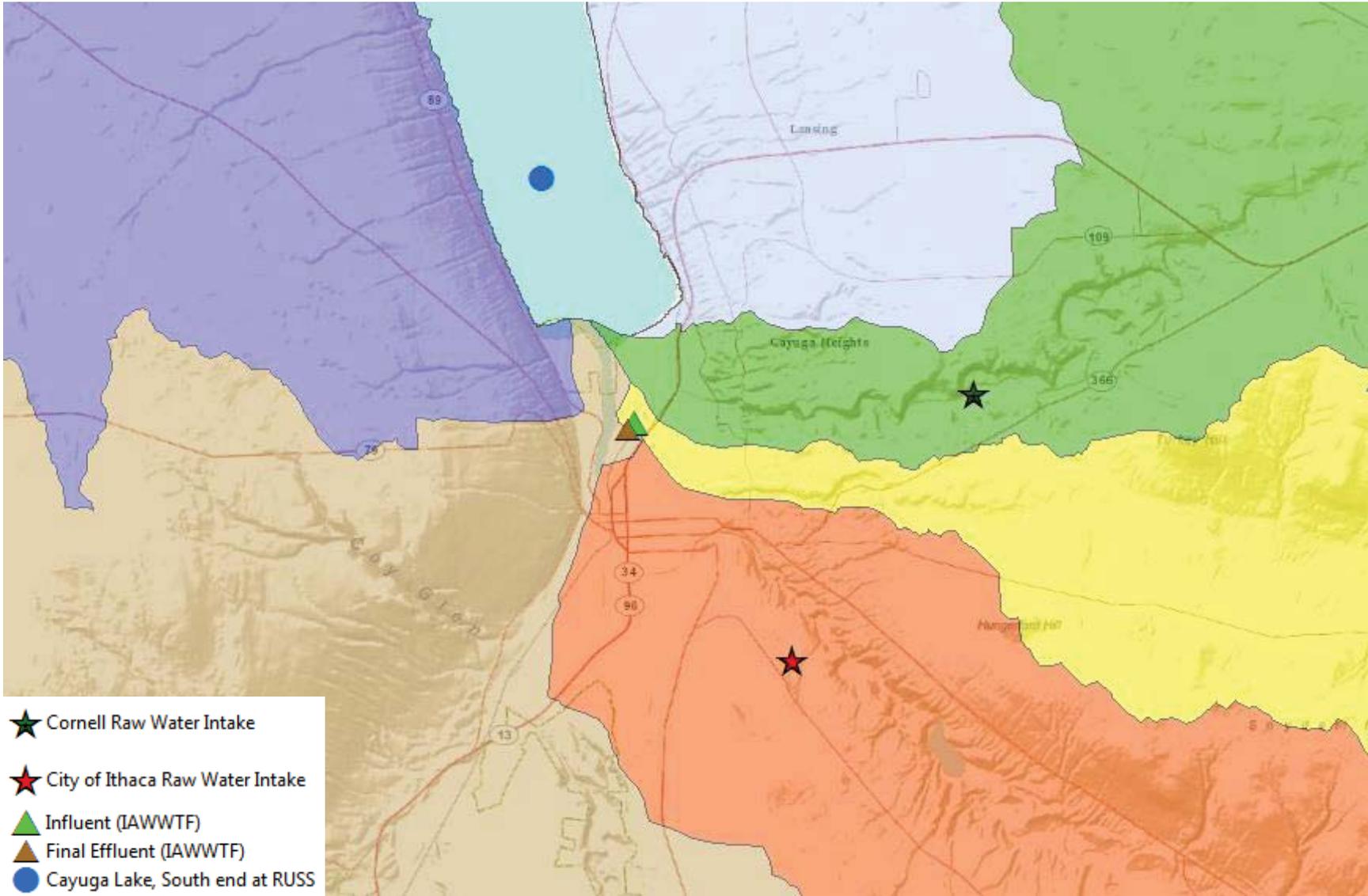
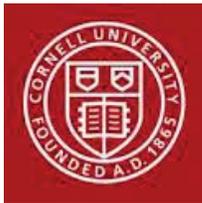
Jose Lozano, Laboratory Director, Ithaca Area Wastewater Treatment Facility
Susan Allen-Gil, Professor, Environmental Studies and Science, Ithaca College
Damian E. Helbling, Assistant Professor, Civil and Environmental Engineering, Cornell University

Emerging pollutants in our watershed and statewide monitoring plans



Tompkins County Water Resources Council
18 April 2016

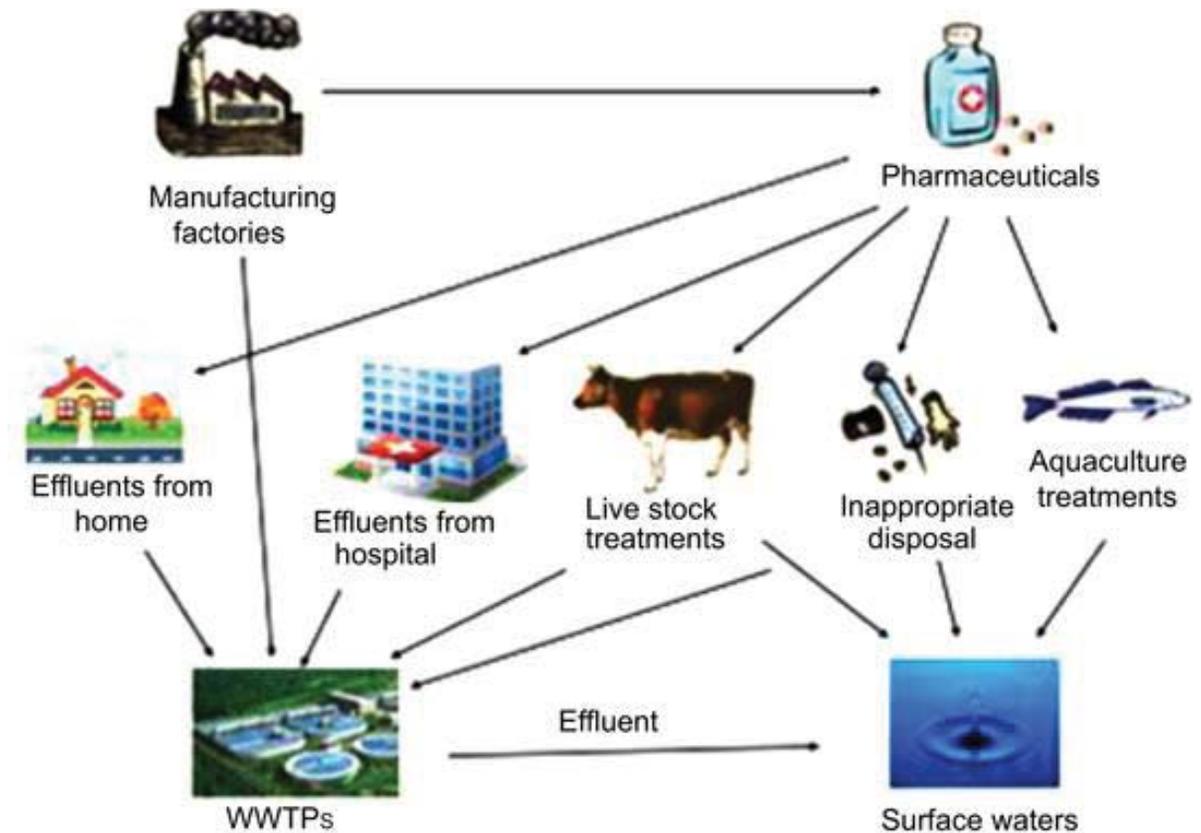
IAWWTF



- ★ Cornell Raw Water Intake
- ★ City of Ithaca Raw Water Intake
- ▲ Influent (IAWWTF)
- ▲ Final Effluent (IAWWTF)
- Cayuga Lake, South end at RUSS

A Sampler: SH2440

- One of four USGS methods
 - Pharmaceuticals
110 compounds
- One sampling event:
July 2014



How much are we talking about?

Top medications by prescriptions

Medications	2014 - number of prescriptions (regardless of how many days)
1. Levothyroxin (thyroid medication)	120 million
2. Acetaminophen/hydrocodone (Vicodin-pain medication)	119 million
7. Metformin (diabetes and obesity)	77 million
11. Amoxicillin (antibiotic)	54 million
18. Sertaline (antidepressant)	44 million
19. Tramadol (pain medication)	44 million

Source: Medicine Use and Spending Shifts, IMS Institute for Healthcare Informatics

Mysterious metformin

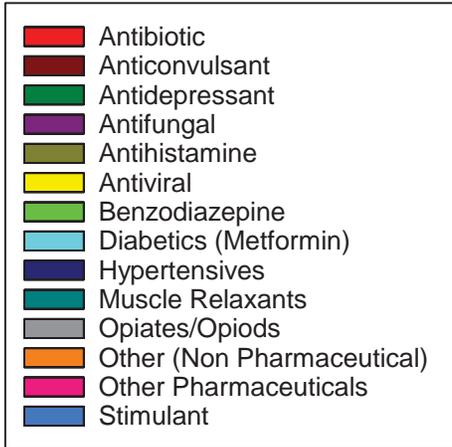
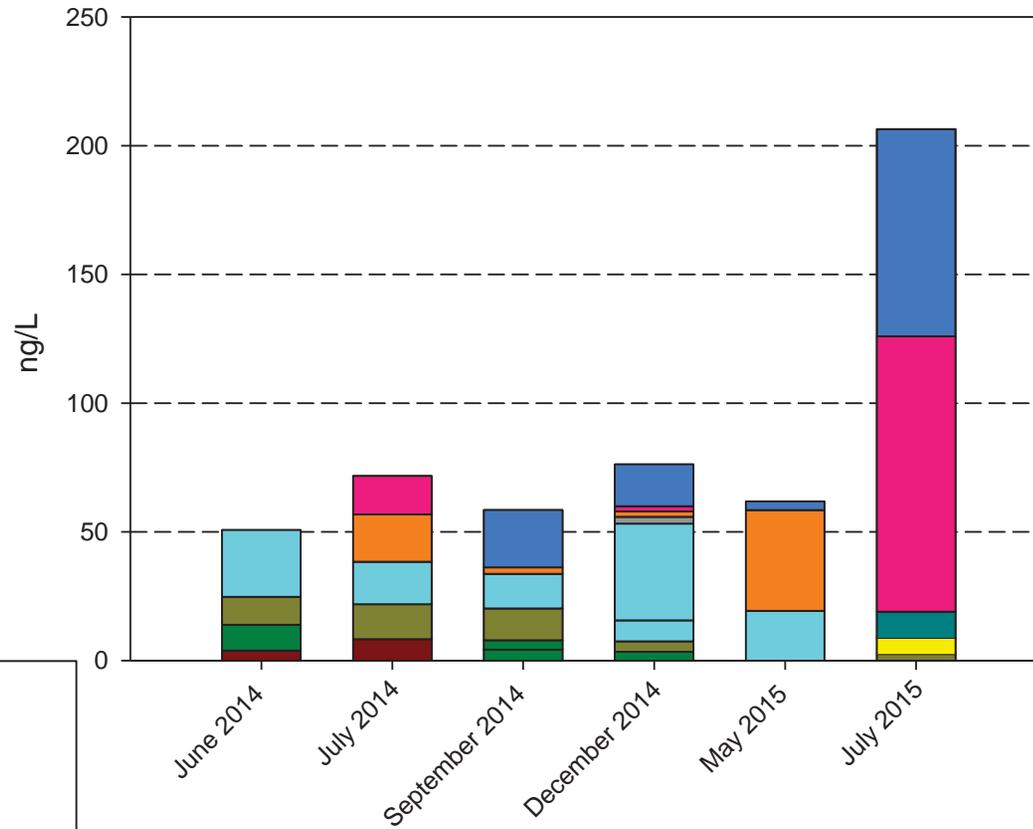
- 7th most prescribed drug in US
- Anti-diabetic, Also associated with weight loss – Obesity Treatment
- High mg/dose (1000 mg)
- 100% excretion
- Very common in surface waters
 - 6 TONS PER YEAR INTO AQUATIC SYSTEMS
- May have endocrine disrupting potential in young male fish



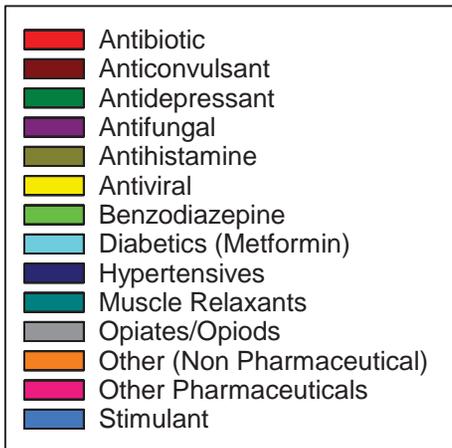
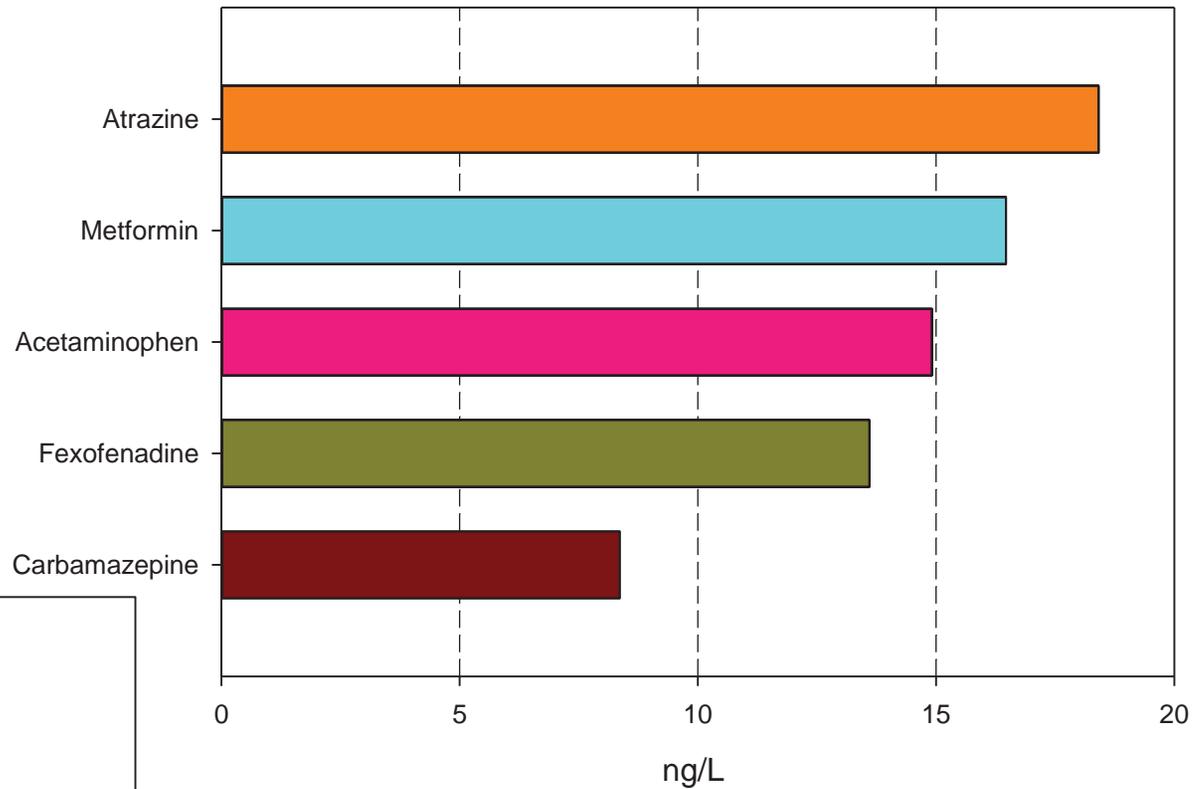
METFORMIN

THE TICKET TO
WEIGHT LOSS??

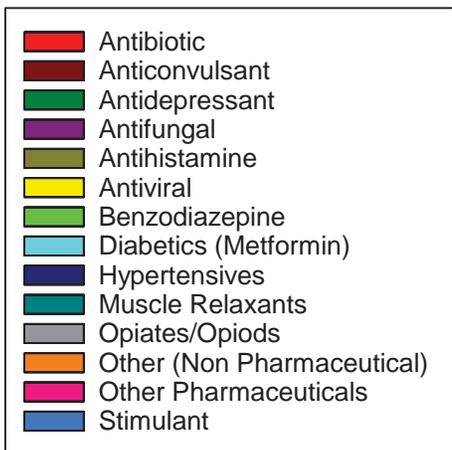
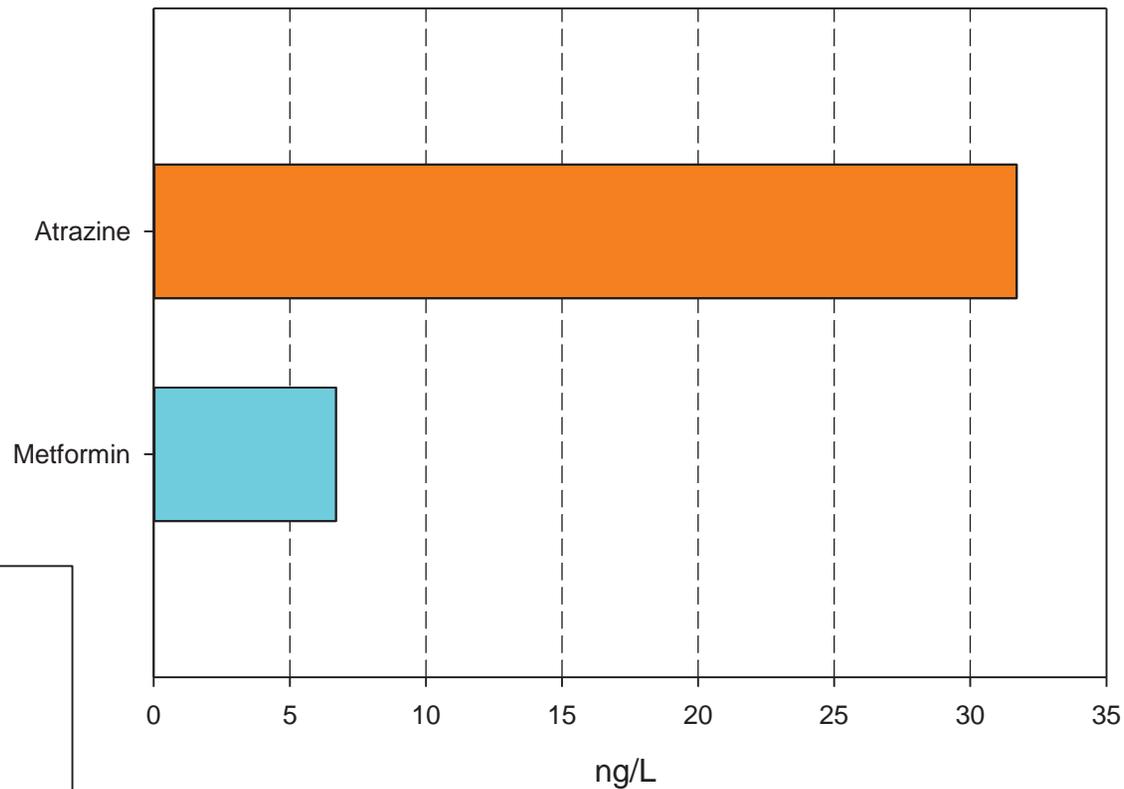
Cornell Raw Water Groups



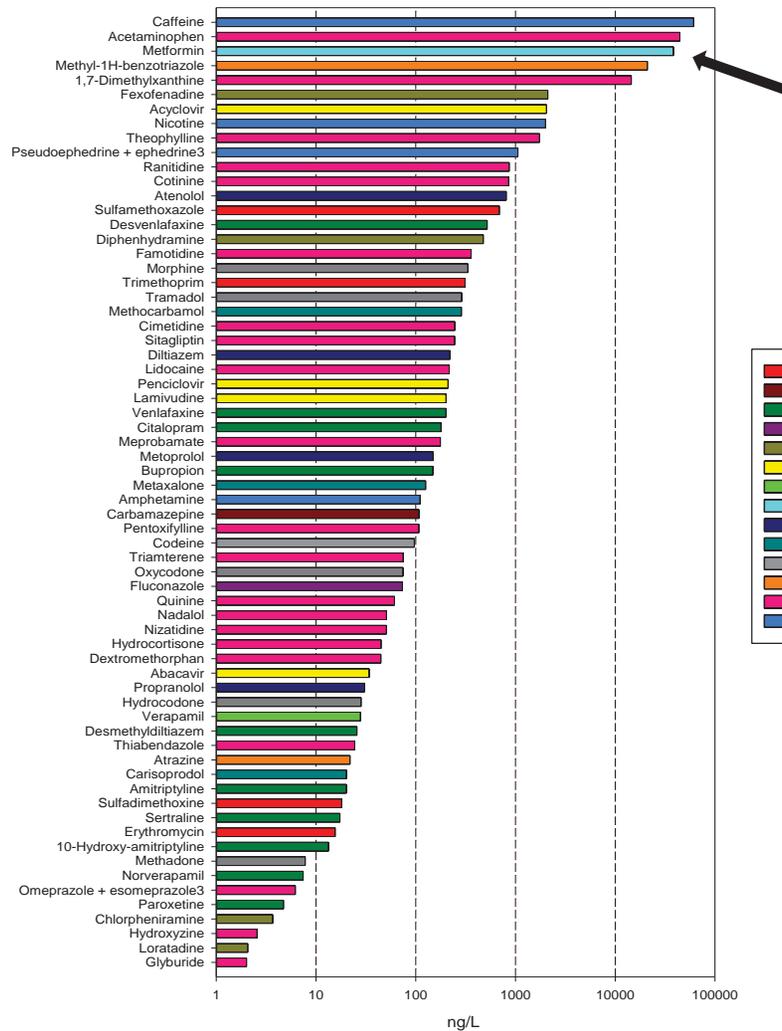
Cornell Raw Water Breakdown July 2014



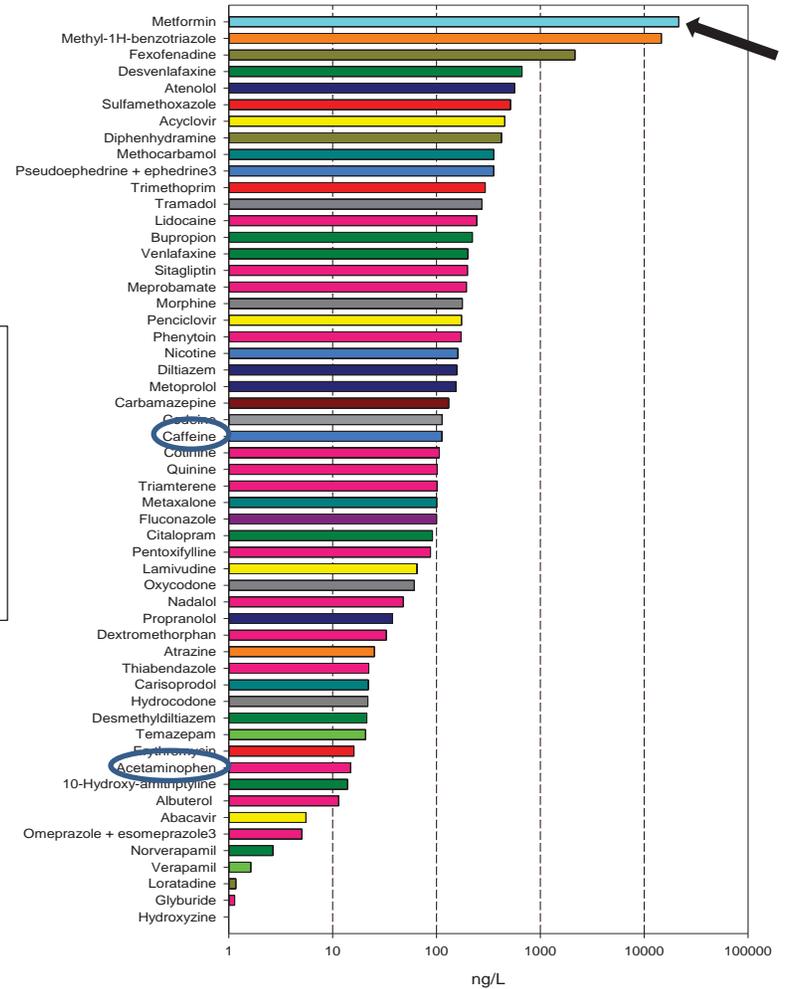
Ithaca Drinking Water Breakdown July 2014



July 2014 SH2440 Influent vs. Effluent

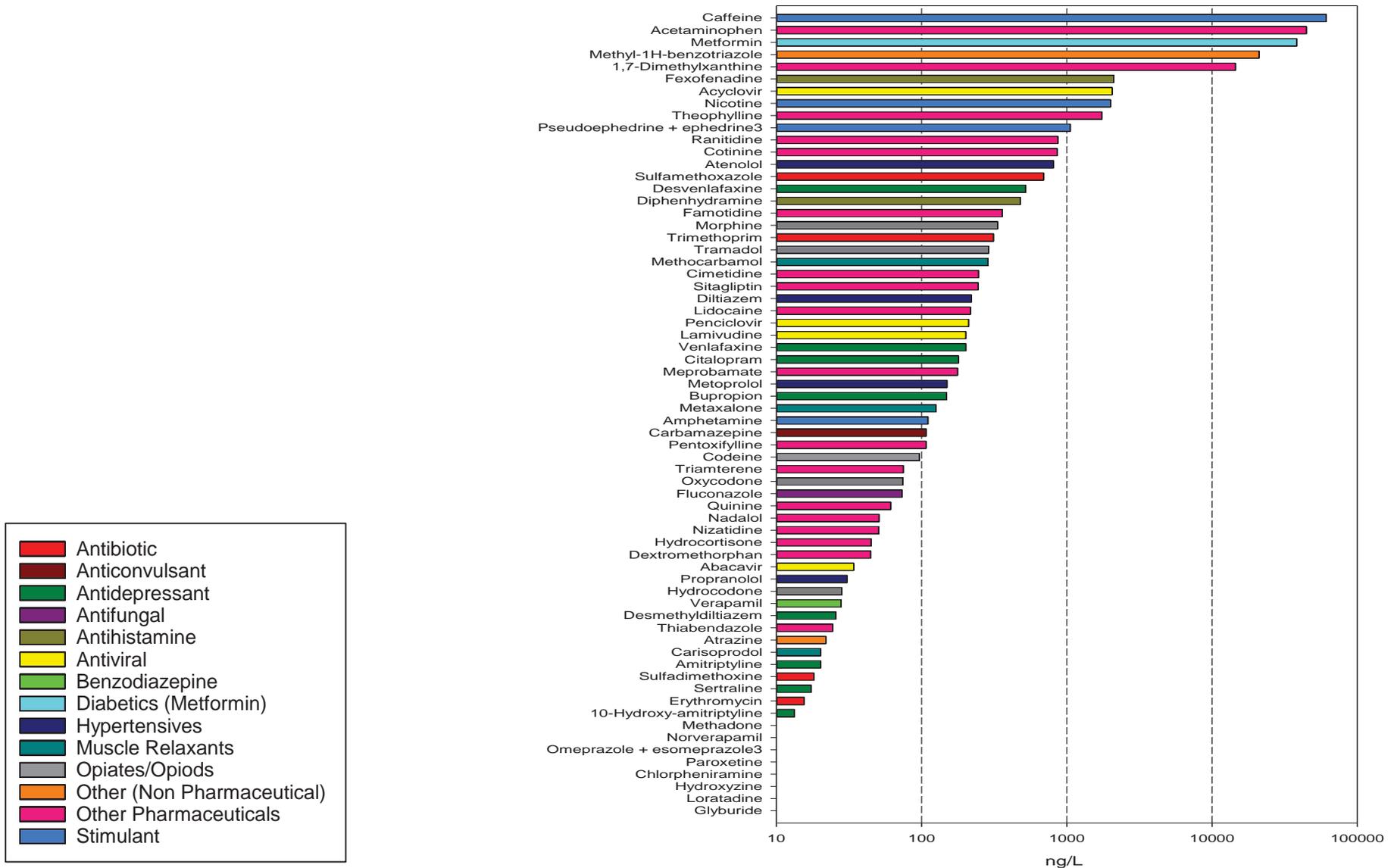


Influent

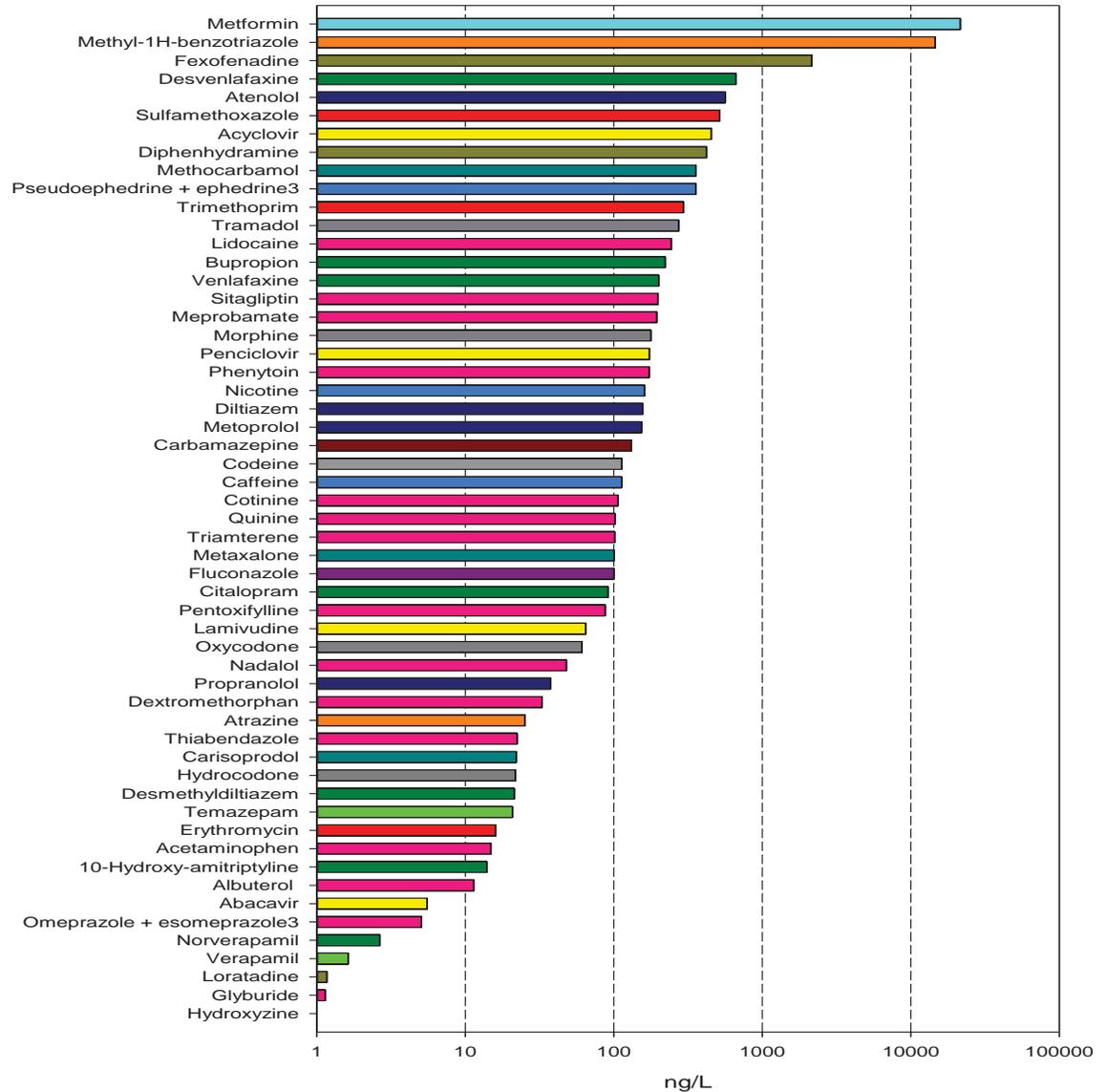
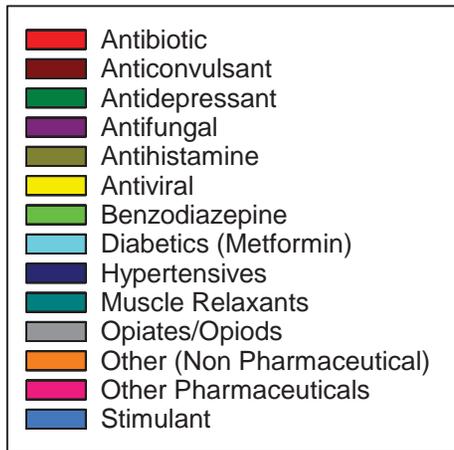


Effluent

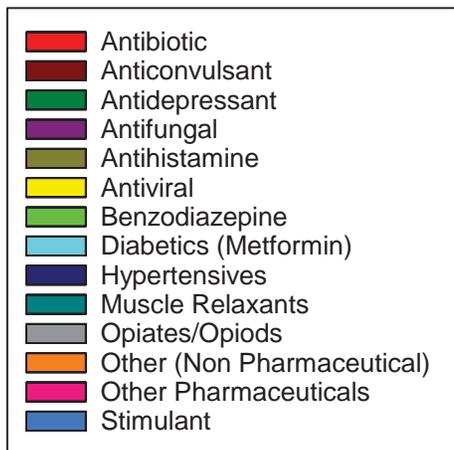
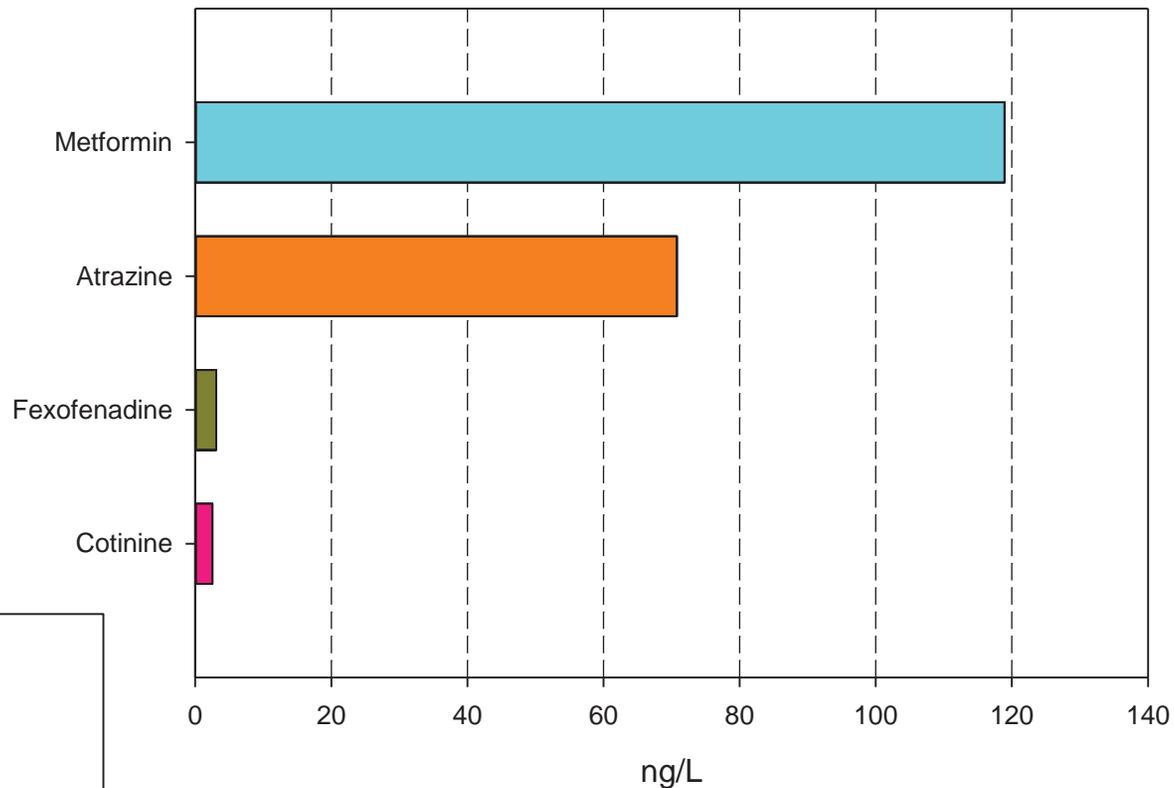
Influent Breakdown July 2014



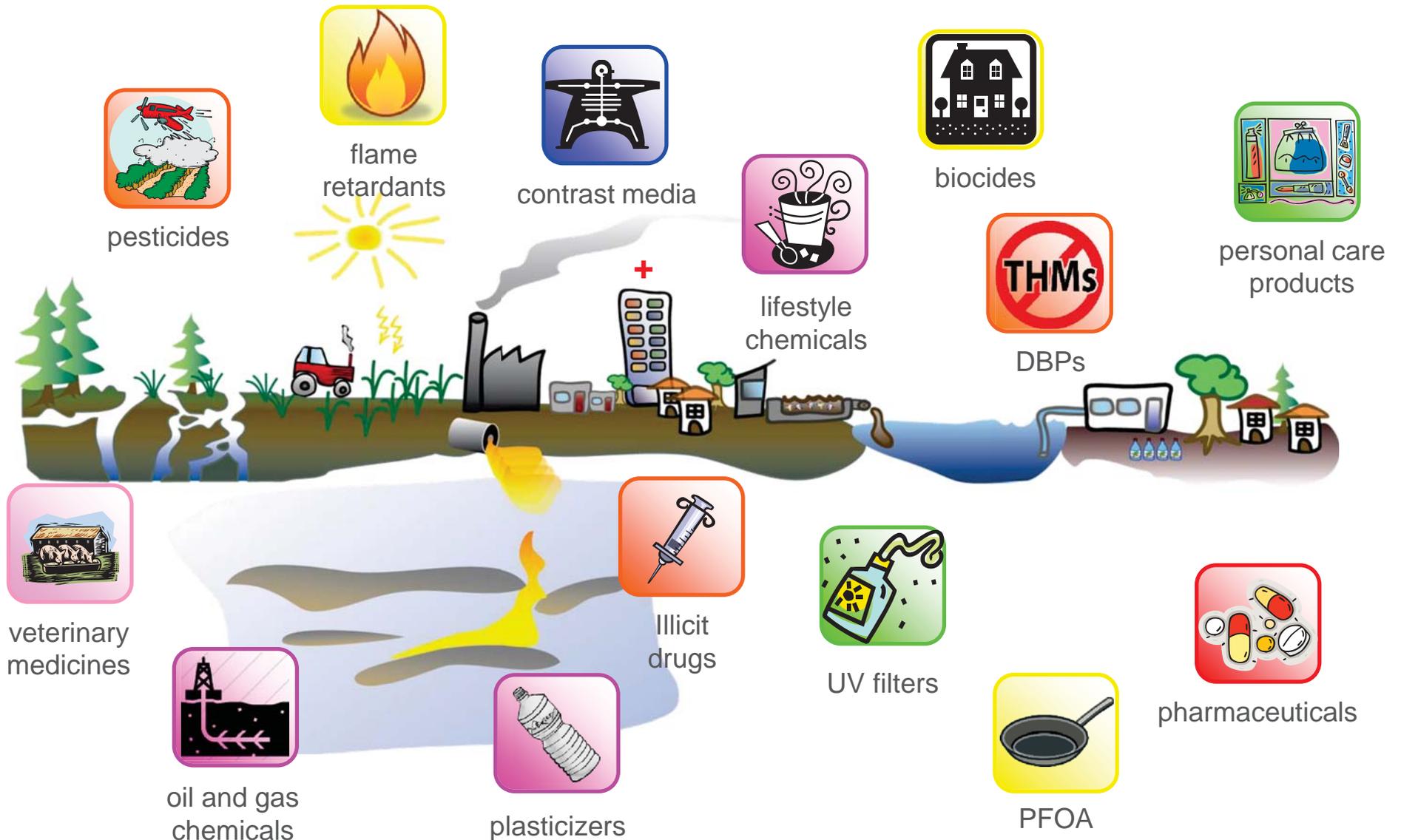
Effluent Breakdown July 2014



Cayuga Lake Breakdown July 2014



Emerging chemical contaminants – types and sources

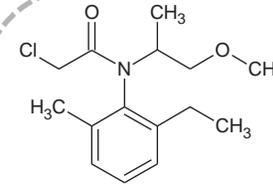
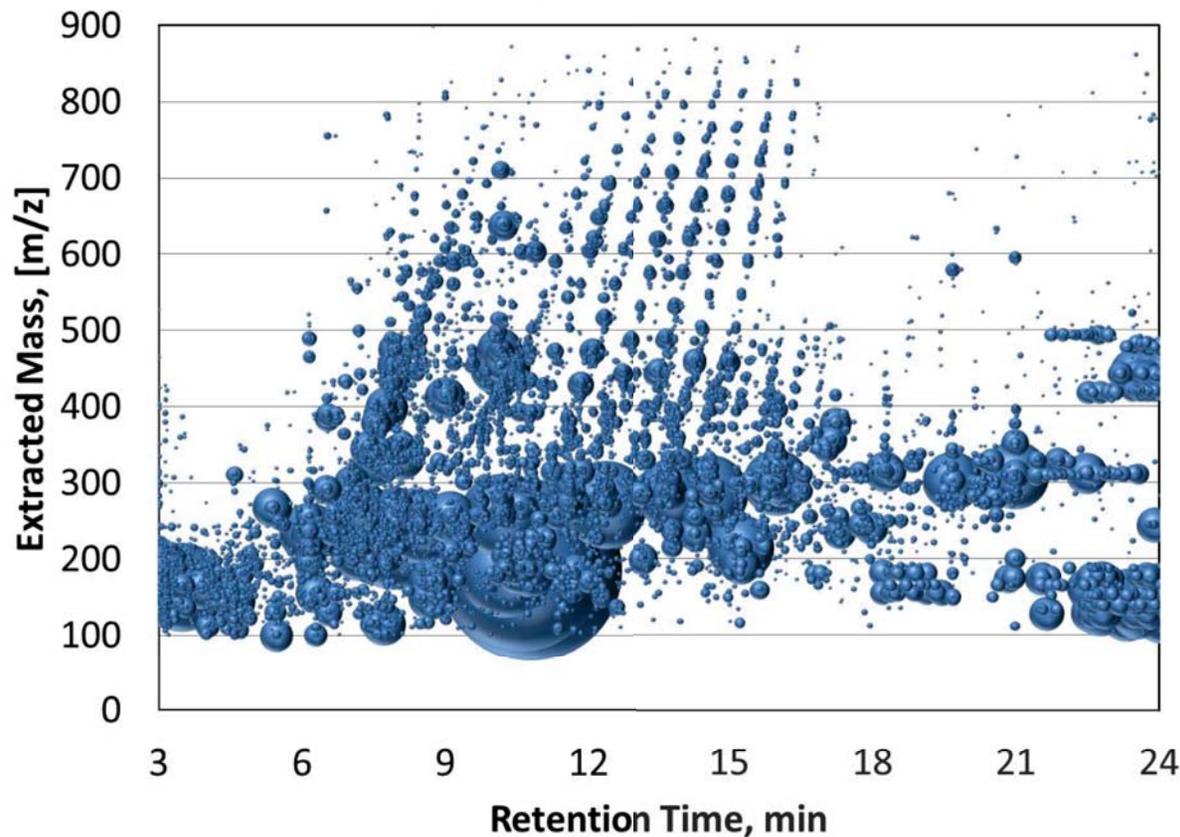


Suspect screening in the Ithaca urban water system

2,740

pesticides, pharmaceuticals, personal care products, industrial chemicals...

Full-scan high-resolution MS acquisition



metolachlor

$C_{15}H_{22}ClNO_2$

$[M+H]^+$ 283.1339

Expected isotope (MS) pattern:

$[M+H+1]^+$ 284.1367 (15%)

$[M+H+2]^+$ 285.1304 (32%)

$[M+H+3]^+$ 286.1338 (5%)

Predicted Retention Time: 10.5 min

Predicted MS2 fragments:

252.11

176.14

134.10

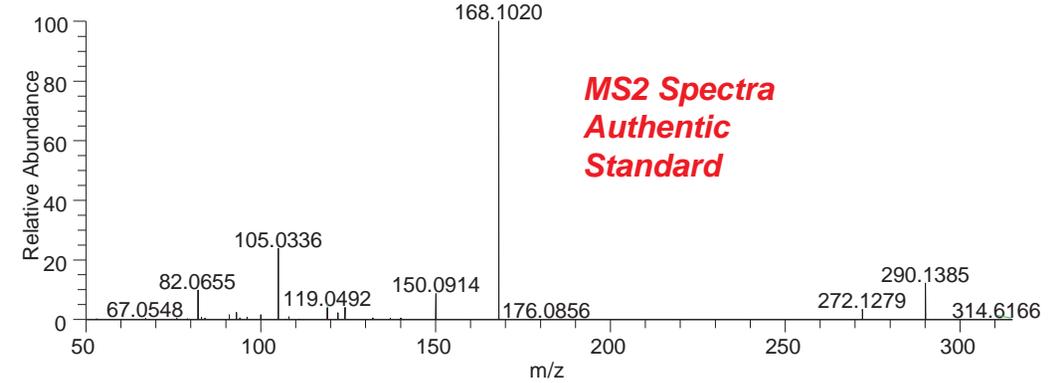
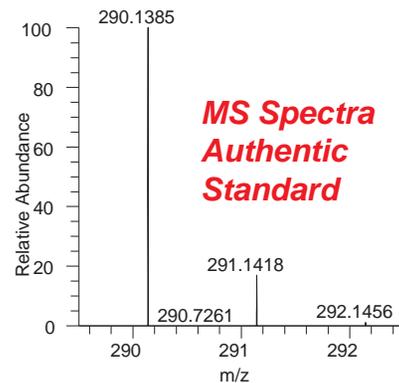
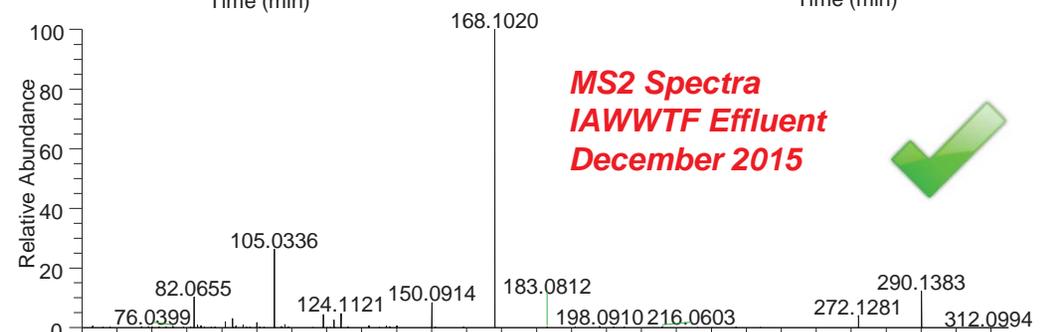
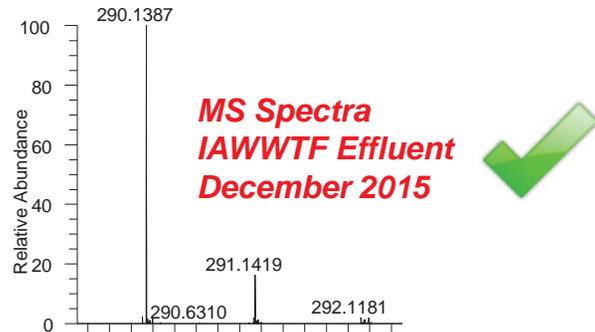
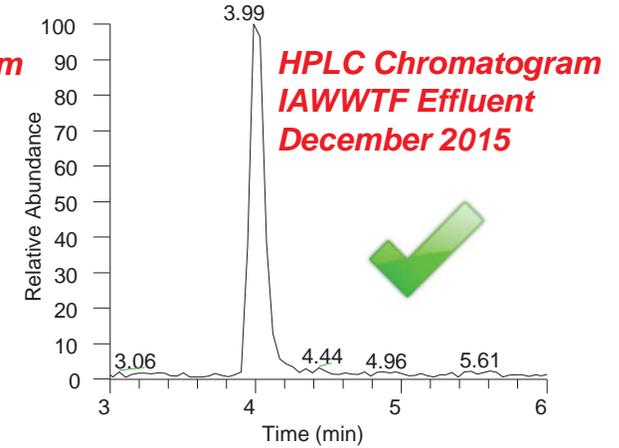
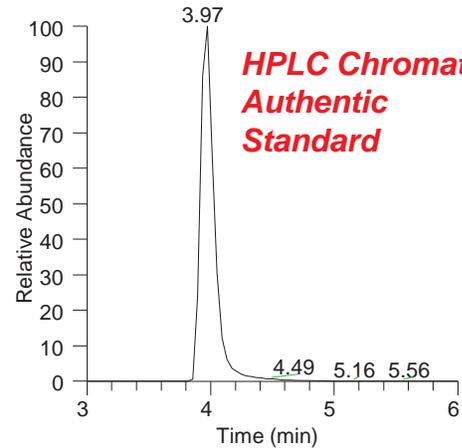
146.10

254.11

Data processing – confirmation of a suspect hit

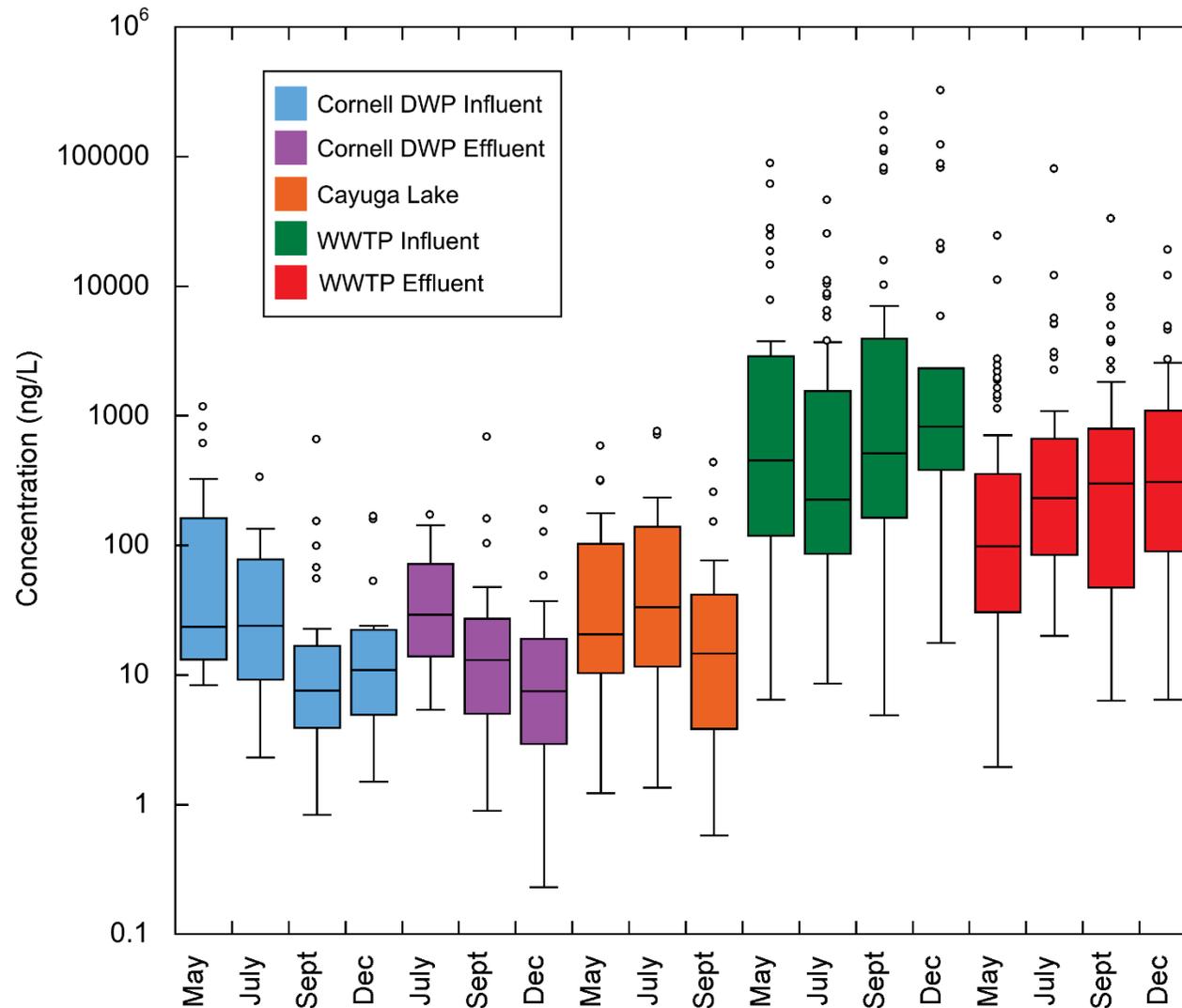


$C_{16}H_{19}NO_4$
[M+H]⁺ 290.1387

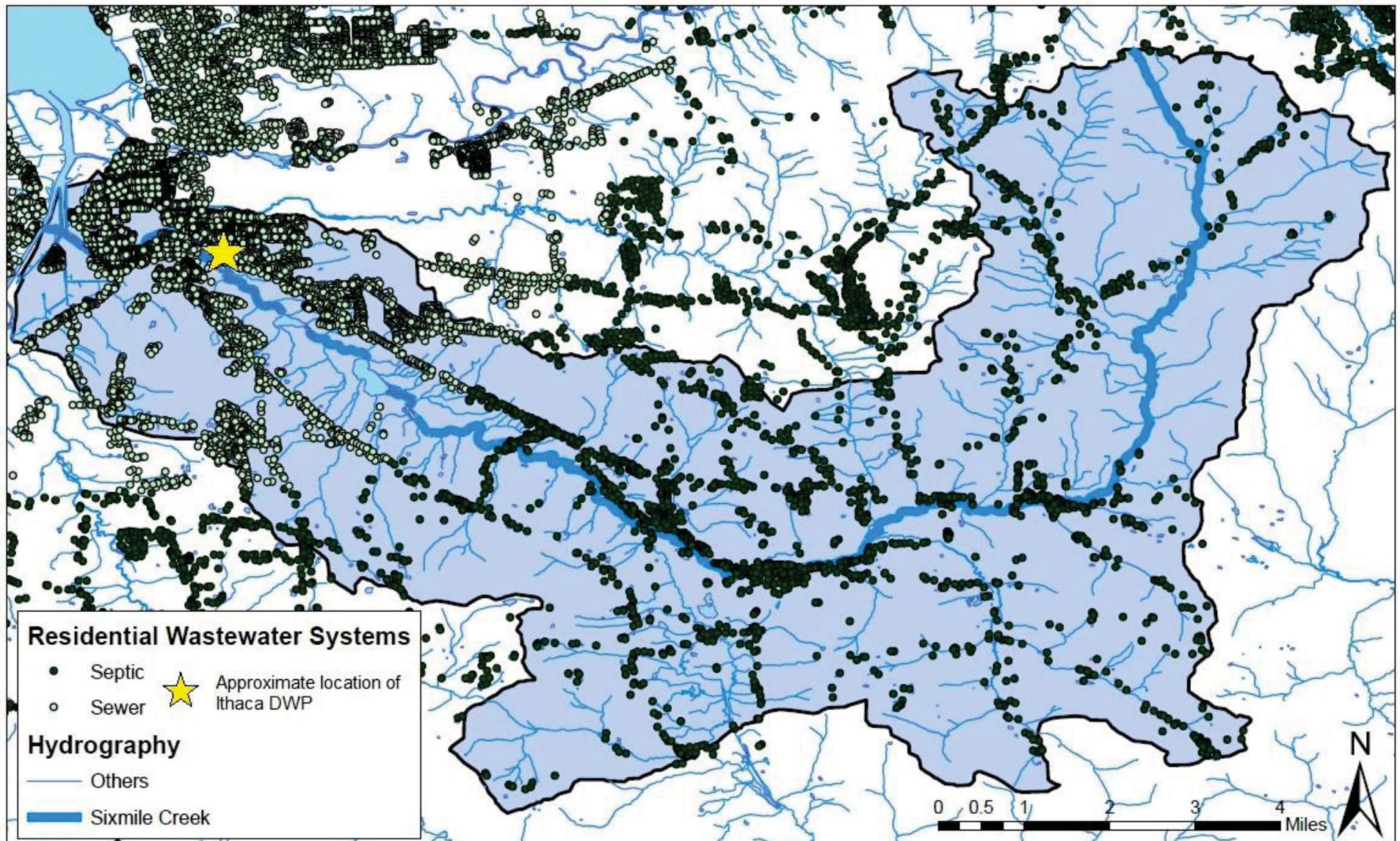




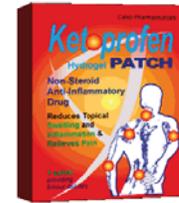
Concentrations of confirmed micropollutants in 2015



Example: Six Mile Creek watershed



Example: Six Mile Creek watershed



New York Times

no.203.078

February 28, 2016

- Since 1851

Fears About Water Supply Grip Village That Made Teflon Products

Jesse McKinley

HOOSICK FALLS, N.Y. — One resident called 911 asking whether the village's water would burn his skin off. Families have lined up to have their blood drawn and their wells tested. Banks stopped giving out mortgages, and some local residents stopped washing their dishes, their clothes and themselves. Erin Brockovich has been to town.

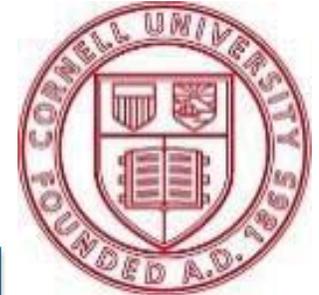
Such are the unpleasant contours of a public health emergency that is playing out in Hoosick Falls, a quiet river-bend village near the New York-Vermont border that has been upended by disclosures that the *public water supply was tainted with high levels of perfluorooctanoic acid, or PFOA, a toxic chemical linked in some studies to an increased risk for cancer, thyroid disease and serious complications during pregnancy.*



Statewide monitoring: developing a rapid response program



**New York State
Water Resources
Institute**



Develop a state-wide coordination of water analysis laboratories and strategies for collecting water samples



Convene a working group to identify critical contaminants that need to be part of the assessment



Develop a protocol for updating the list as new contaminants are identified



Launch a demonstration program in 2016 over a small area (1 or 2 counties)



Propose a state-wide program in 2017 with committed participants ready to engage



Summary of key points

- 1. A collaborative monitoring program** has been underway for two years
- 2. Suspect screening** is a powerful new tool that helps emerging contaminants “emerge”
- 3. Septic systems** are an underexplored source of emerging chemical contaminants
- 4. A statewide rapid response program** has been proposed and is currently under review. **Tompkins County** is under consideration as a potential demonstration site