Jessica Glowczewski

Watershed Superintendent

Akron's Perspective: Reservoir Management for HAB Mitigation (and other stuff)

AKRON
Your Clean Water Resource

ALL-AMERICA CITY 1981 1995 2008 AKRON


Potentially Harmful Algal Bloom
Reservoir
Coming to a ~~Theatre~~ near You!!!

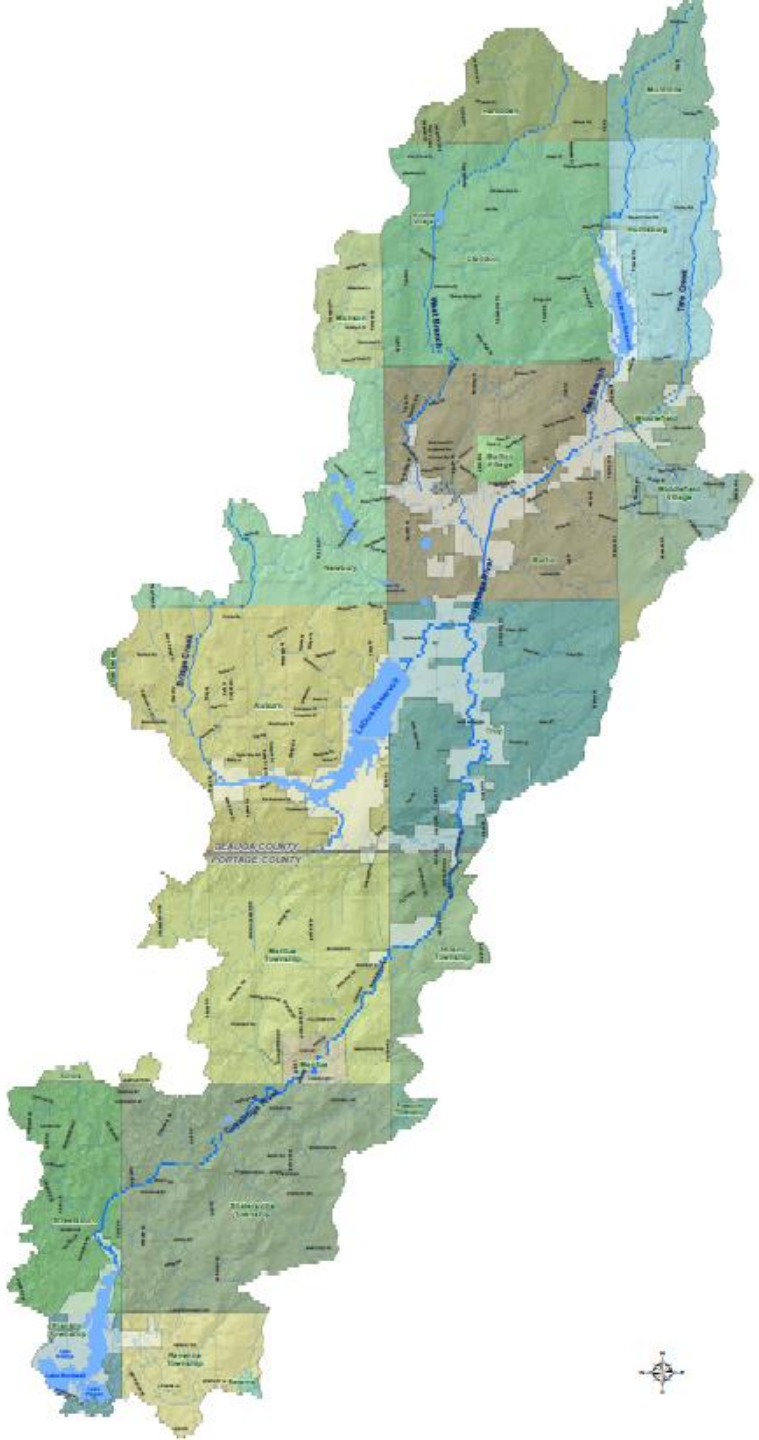
Akron Water Supply

- 35 MGD average
- Conventional Filtration Plant
- Provides water to about 300,000 people
- Located in Kent, Ohio

Akron Watershed Division

FUN FACTS:

- UCRW 207 miles (134,463 acres)
- 3 Reservoirs: East Branch, LaDue and Rockwell.
- Akron owns 12% of the UCRW (15,941 acres), including 36.3 miles (31%) of river frontage
- 47,542 acres Ag in UCRW (32.5%)
- 74 NPDES Permitted WWTP discharges
- 7 employees

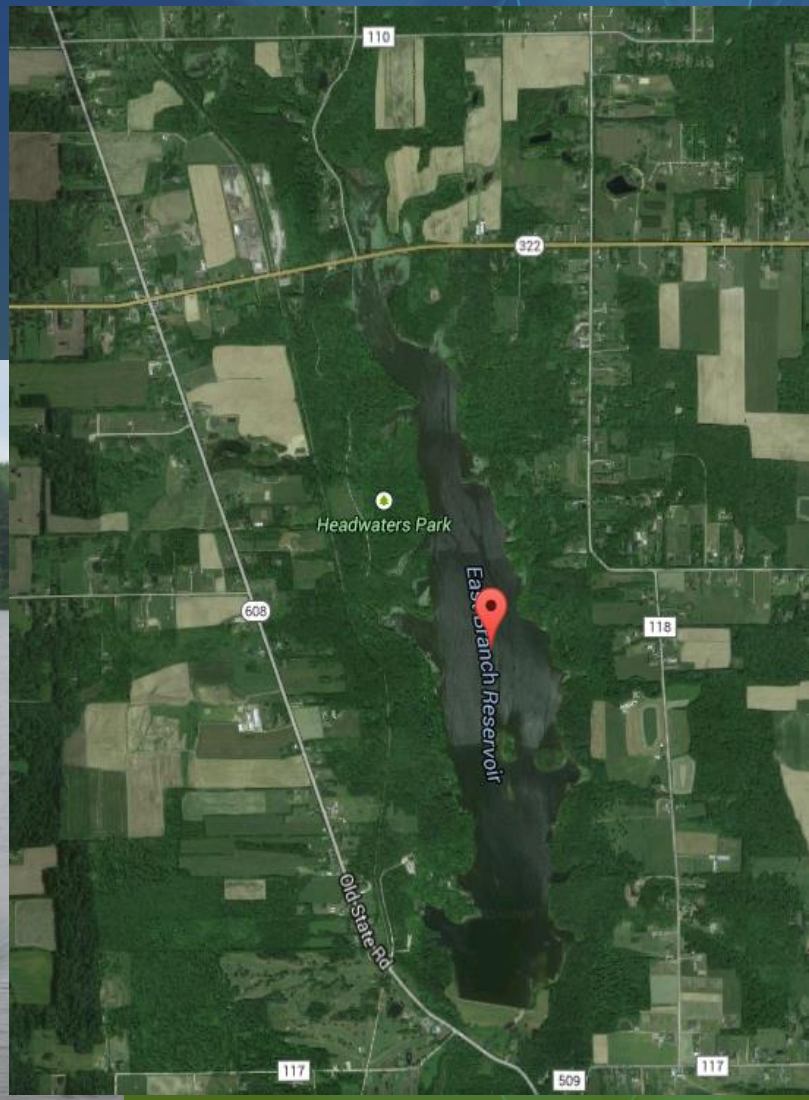


Lake Rockwell Reservo

- Impounds Upper Cuyahoga River
- 770 acres surface area
- 207 square mile watershed
- Cost for treatment plant and Reservoir: $815,000 in 1913

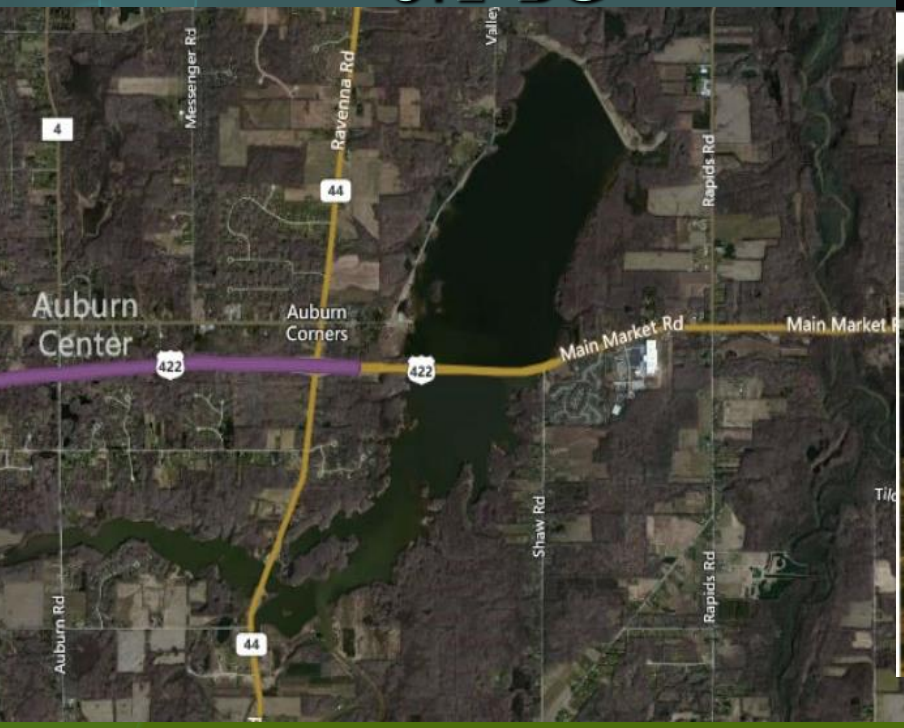
East Branch Reservoir

- Impounds East Branch Cuyahoga River
- 1.35 BG, 1938
- Cost: $658,000, PWA grant : $268,000



Wendell R. LaDue Reservoir

- Impounds Bridge Creek and Black Brook (tribs of Cuyahoga)
  - 1,550 surface acres - Completed in 1962
    - 6.1 BG



Mom's Famous Algal Bloom Recipe

- 1 water body (preferably eutrophic and/or with high detention time)
- 2-3 days sunshine
- 1 pinch nitrogen (optional)
- Phosphorus to taste

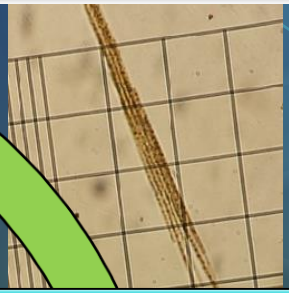
Mix slowly and bake at 20-30* C (68-86* F) until full bloom

Cyano fun facts!

The oldest known fossils, in fact, are cyanobacteria from Archaean rocks of western Australia, dated **3.5 billion years** old. This may be somewhat surprising, since the oldest rocks are only a little older: 3.8 billion years old!

Fossil Record of the Cyanobacteria
www.ucmp.berkeley.edu/... University of California Museum of Paleontology

Spring (warming water temp, introduction of nutrients initiates germination of akinetes)



Early Summer
exponential increase
(increasing temp, runoff and day length)

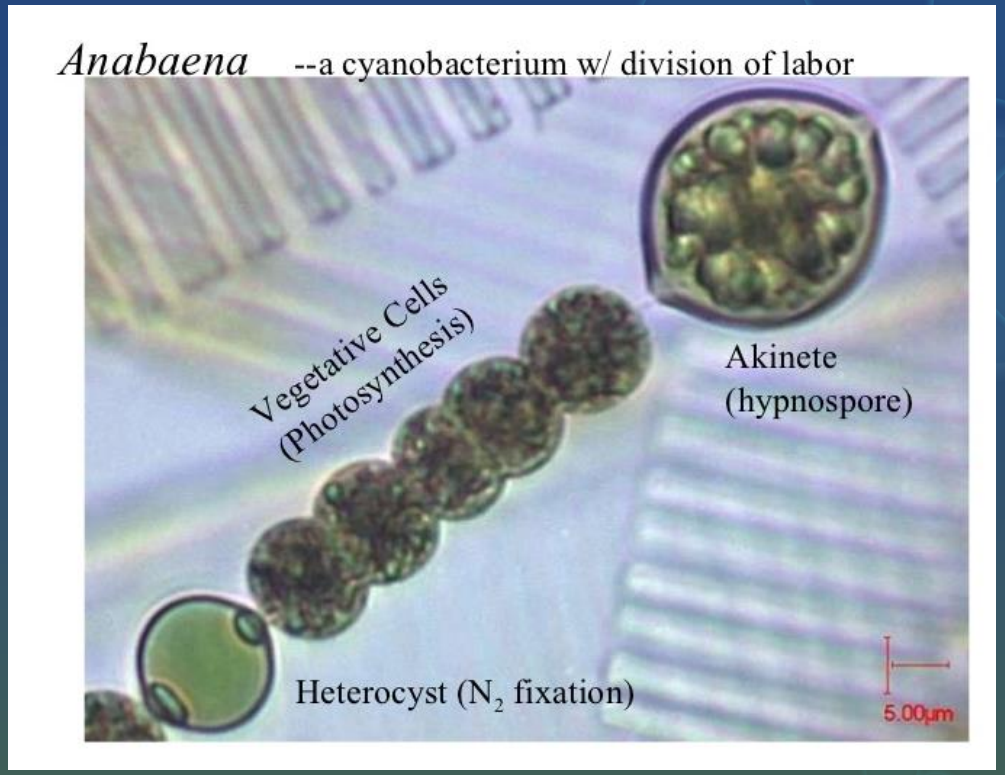
Summer-Fall
BLOOM!

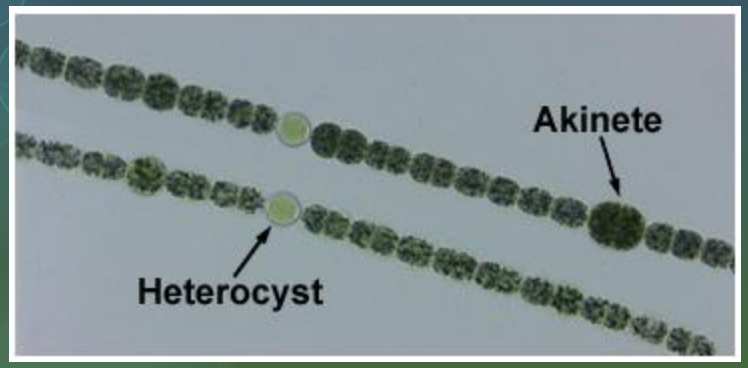
Nitrogen limitations create N fixing heterocysts

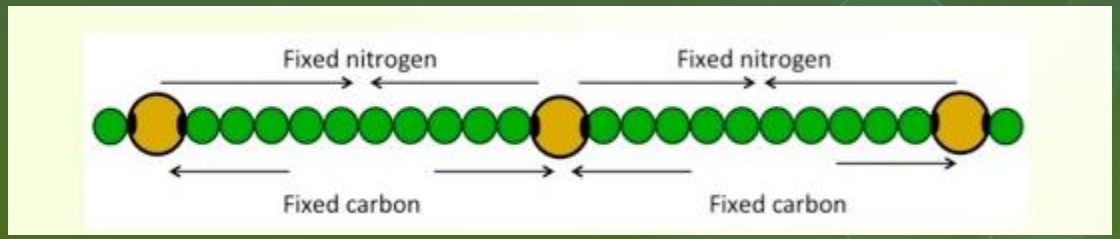
Late Summer-Late Fall
Bloom collapse factors: decline in temp, light and nutrient availability causes development of akinetes

Winter
Sedimentation and overwintering of akinetes (resistant spores)

No Nitrogen, No Problem

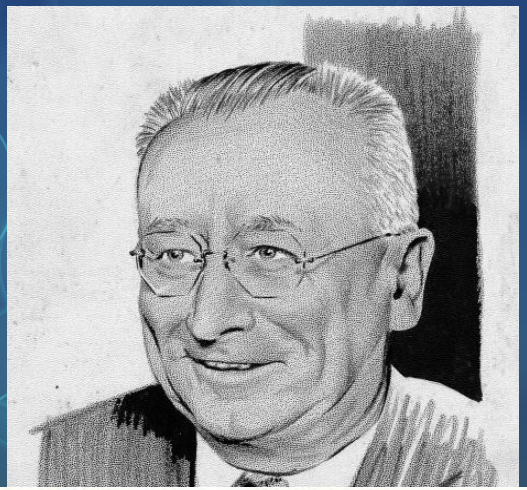


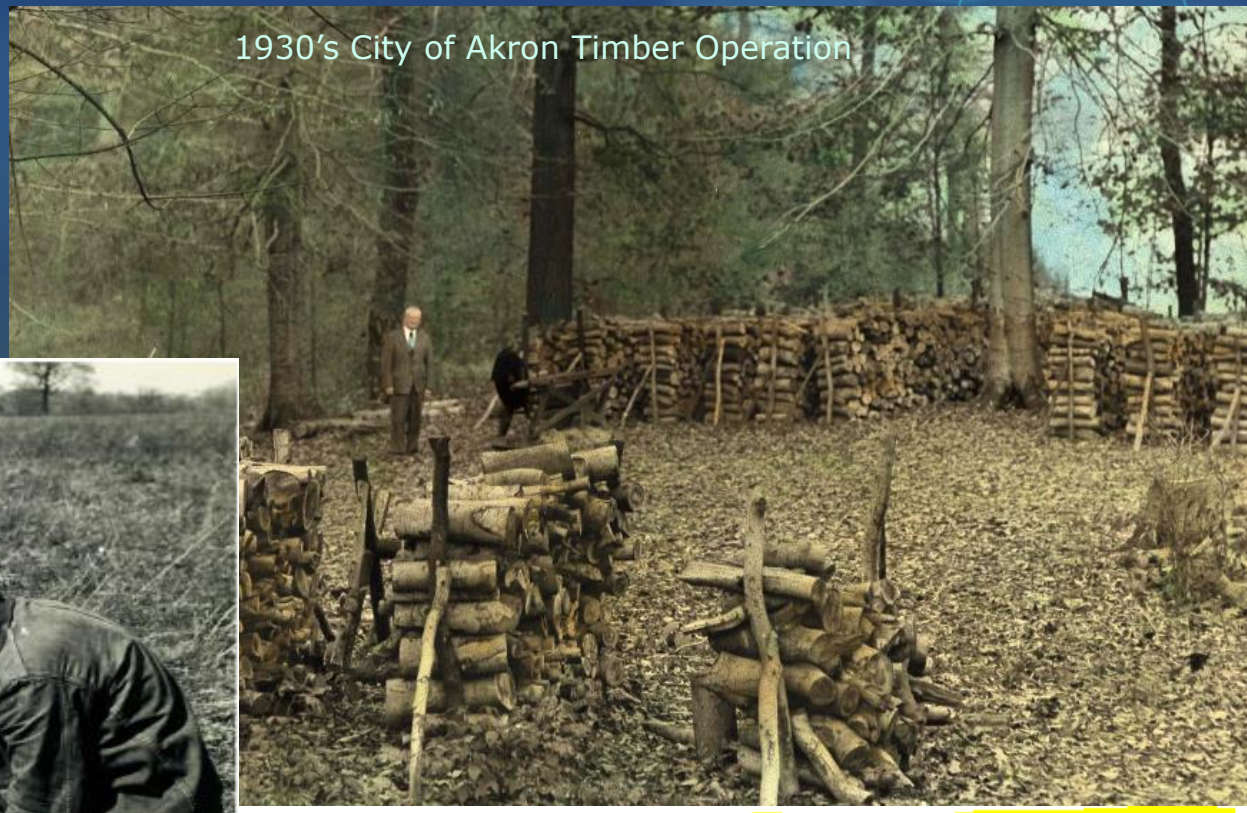




http://www.slideshare.net/mksateesh/mks-cyanobacteria

LaDue's Watershed Programs





1930's City of Akron Timber Operation

769 Acres Of Water

There are reasons for these things, according to W. R. LaDue, water department superintendent.

The vineyard and orchard exist because the city must own the land surrounding the reservoir to safeguard the water supply, and yet they afford a source of revenue from the land.

The pine trees represent the first of many far-reaching steps to provide pure, colorless and odorless water for the city system.

"When evergreen needles fall they prevent weed growth, keep back soil erosion and preserve the moisture in the banks instead of dissipating it," explains Mr. LaDue.

Copper sulphate is used to control weed-growth in the reservoir, which has a surface of 769 square acres. The flow line is 1052 feet above sea level and 480 feet above Lake Erie.

The water begins its journey through the purification plant and pumping station a heavy metal screen adjoining the 280 feet dam.

Raw water from the dam flows by gravity through a 48-inch cast iron pipe a half mile to the purification plant. When the demand

d Ads

The Akron Times Press

AKRON, OHIO, WEDNESDAY, JUNE 10, 1931

Shores Of Lake Rockwell And Troy Reservoir Made To Blossom Like Rose By Modest City Water Chief

Weeds, Underbrush Give Way to Modern Orchard, Nursery

MAKE A PARADISE

Beautiful in Blossom, Trees to Give Bountiful Yield

By EVAN WILLIAMS, JR.

IMMACULATE, quiet-spoken Manning Perlee Tucker, superintendent of the Akron waterworks, was raised on a farm near Cincinnati.

His current ambition is to retire to some broad, rolling acreage and live the life of a gentleman farmer.

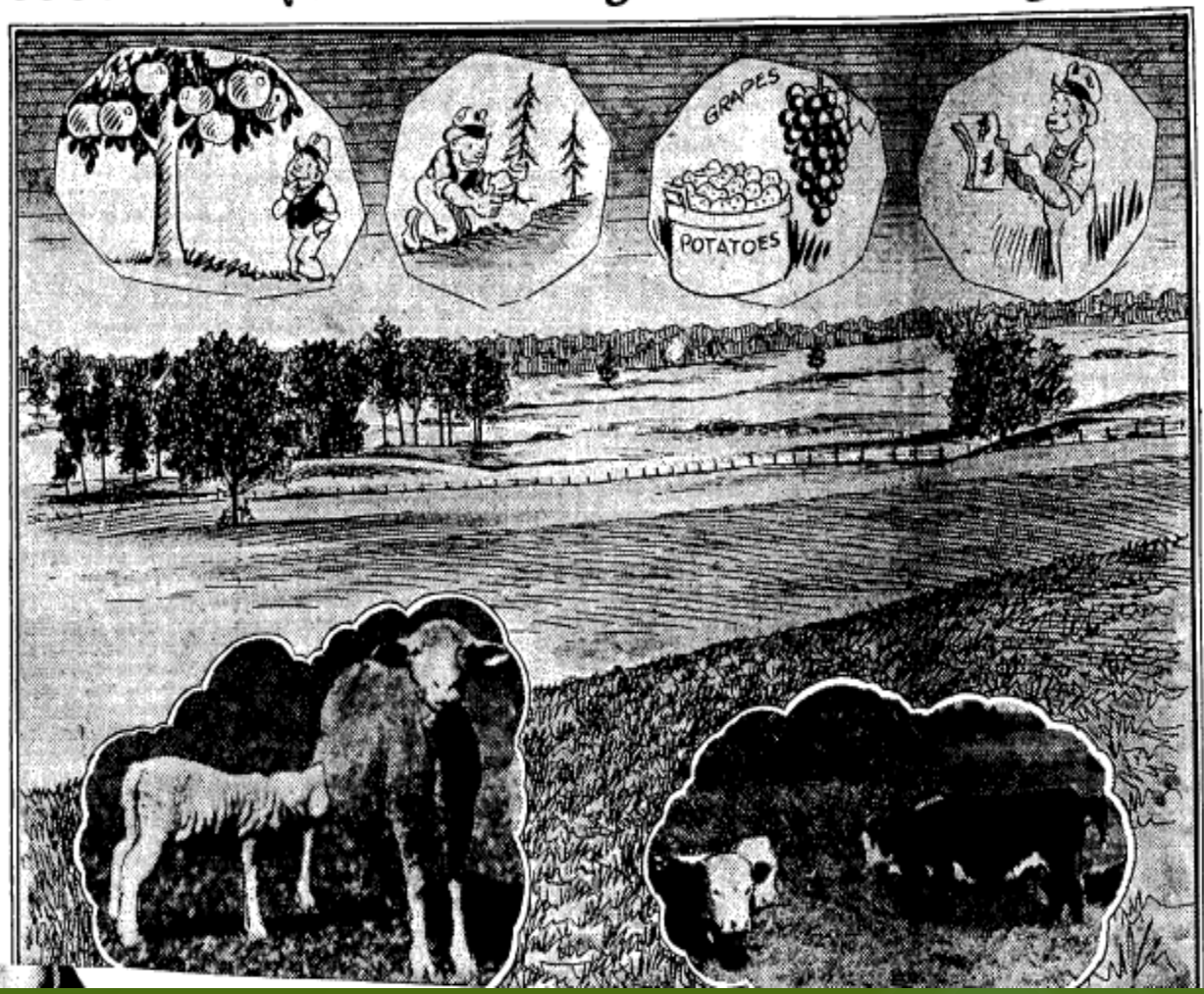
That, perhaps, explains the agricultural activities at Lake Rockwell and Troy Reservoir.

The shores of Lake Rockwell, once overrun with weeds and underbrush, have been transformed into a modern orchard and nursery.

Thousands of apple, pear and cherry trees make a paradise of blossoms in the spring, and bear their fruit in the summer and fall.

Forty acres of swollen, purple grapes are gathered in the fall. "The finest grapes you ever tasted," boasts Superintendent Tucker.

500,000 Pine Trees



Cattle and Sheep Keep Land Clear; to Yield Profit

FINE HEREFORDS

Farms Will Furnish Potatoes to Feed Akron's Needy

have not sprouted yet. Almost perfectly matched, their red bodies, white faces and chests just miss being shaggy. Short of leg they are and heavy of body.

So equal are they in size, one could line up a dozen of them and span them with a board, being almost unable to put one's hand between the board and the back of any steer.

Cattle experts at Wooster advised the purchase of Hereford steers. They have little or no reputation as dairy cattle, but are a hardy breed and produce an extremely fine grade of beef. Docile and curious, they will even now approach within a few feet of a man, and will be entirely tame in a short time. Being docile they fatten easily and readily.

Fine Beef Breed

As evidence that they are a fine beef breed, the Hereford is now the most numerous ranch animal in the United States and Canada.

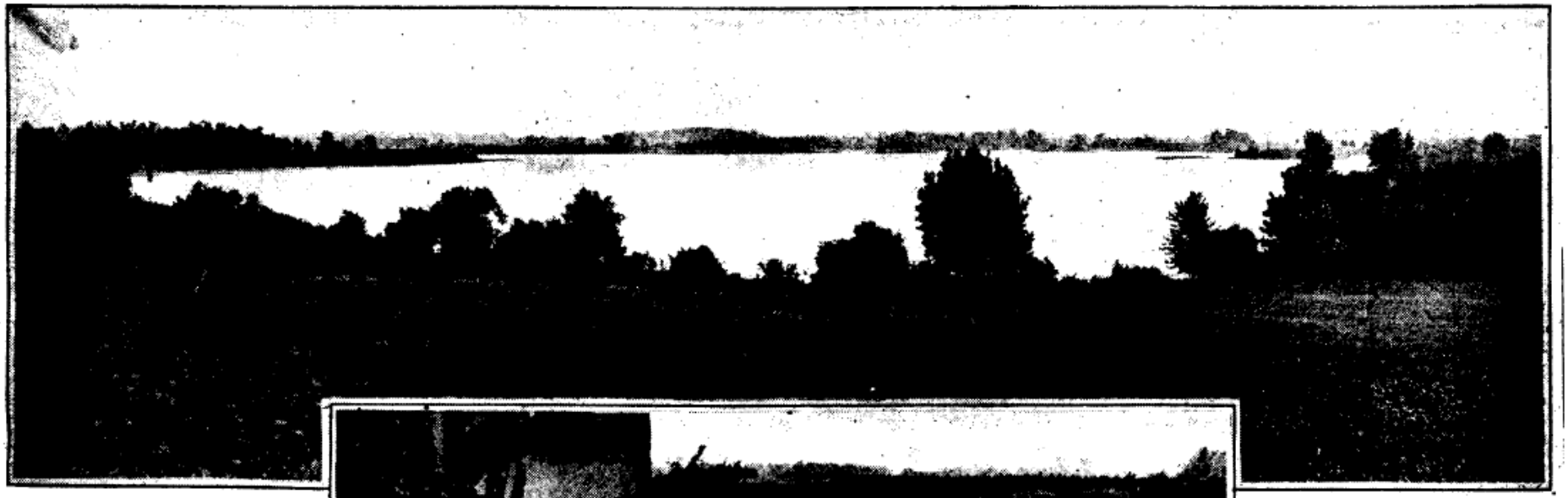
By Christmas the beef will be prime for the market and with any kind of a price at all will bring in between $10,000 and $15,000, leaving sufficient cattle for breeding.

Akron Times Press

WANT ADS — COMICS | AKRON, OHIO, THURSDAY, SEPTEMBER 13, 1934 | EDITORIALS

'Old Pine Tree' Protects Akron Health

Half Million Of Its Brothers Also Help Guard Lake Rockwell



Taxpayers Are Kept Out Of One Of State's Most Beautiful Parks For Own Good

This is the second of a series of stories on Akron's water supply.

By A. H. SYPHER

YOU and other Akron taxpayers own one of the most beautiful and well-kept parks in Ohio, but stout brass padlocks guard every

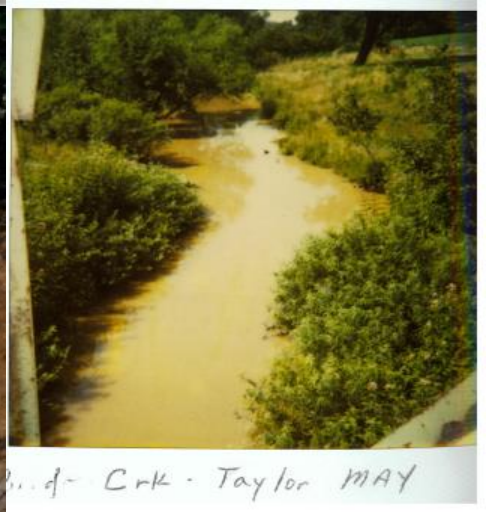
Pure Water Is Provided After Long Process; 20 Tons Of Coal Are Used Daily

result from algae growth.

Then, just before the filtration process 1000 pounds of calcium oxide, or quick lime, is mixed into the water to soften it and take out the carbon dioxide.

This is a process that vitally affects the pocketbook of every city water user, for it removes the corrosive action, which in some cities

Environmental Monitoring and BMP installation

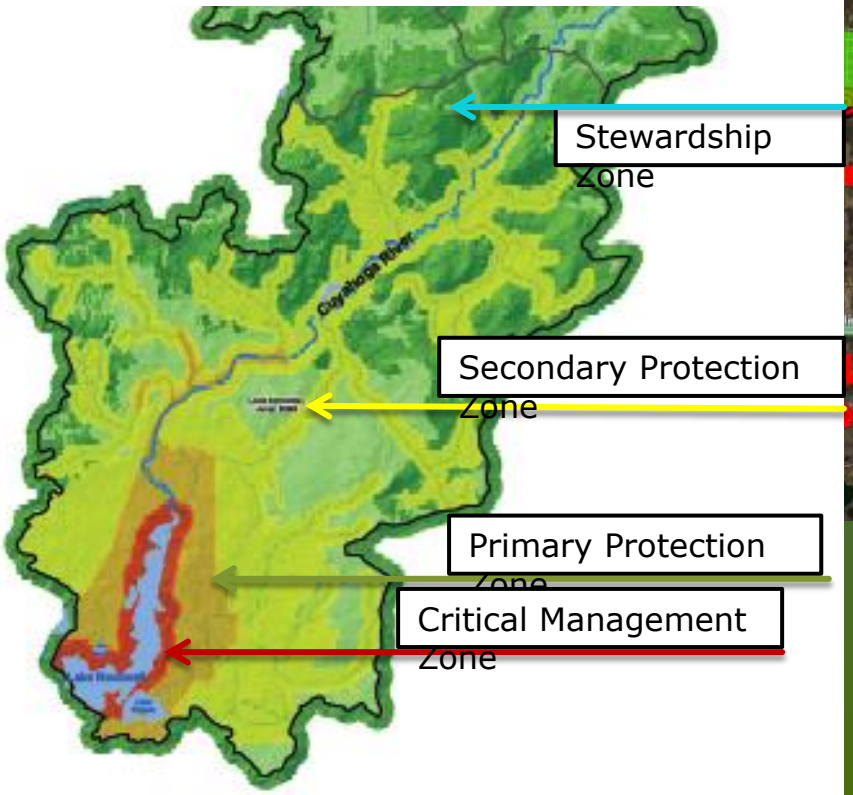


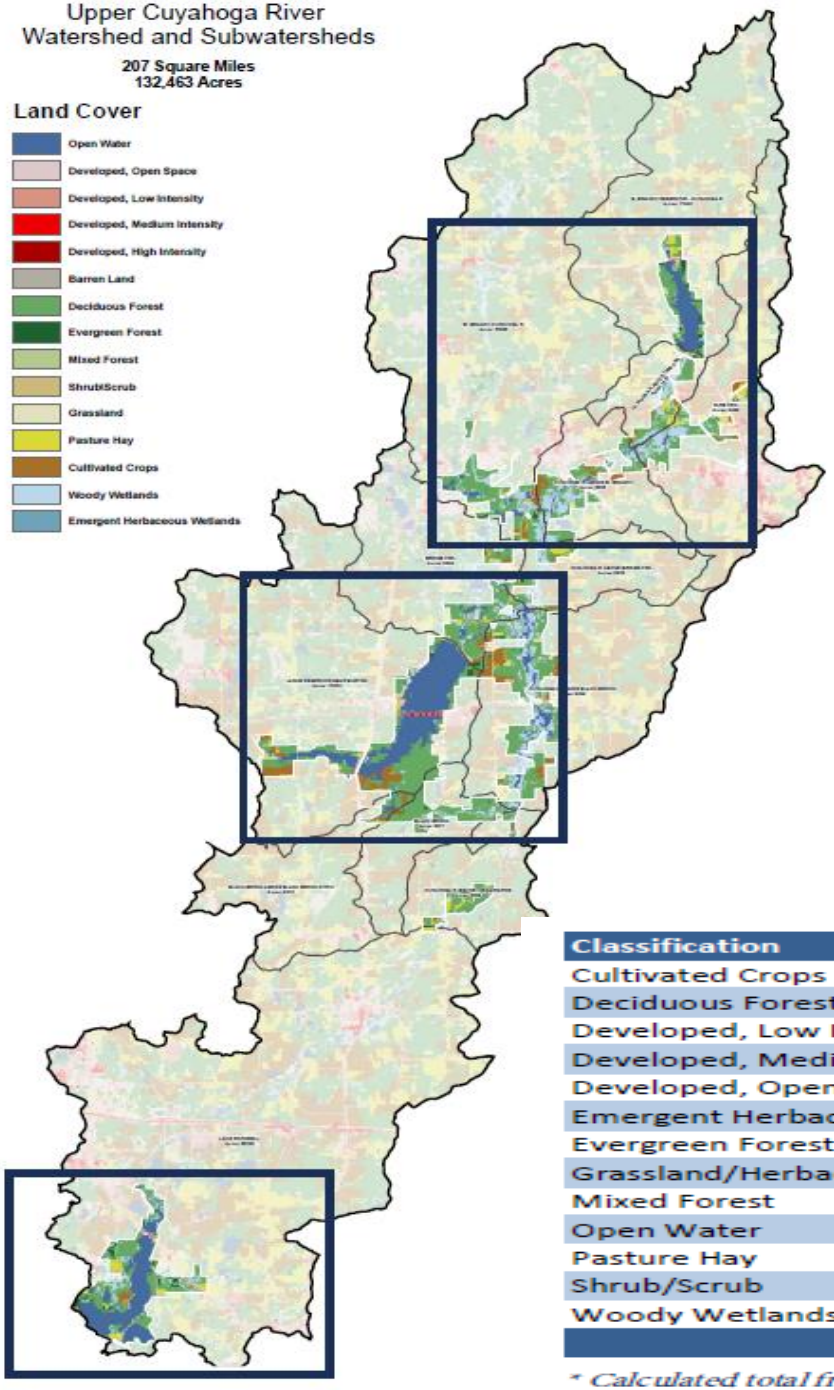
Akron's Strategy: Prevention

- Watershed Control Program
- Reservoir Management
- Algae Sampling
  - qPCR
  - microscopy

How do we prioritize for water source protection?

City of Akron Watershed Protection Policy Guide	Property Acquisition	Conservation/Deed Restriction/TDR	Public Outreach/ Education /Stewardship	Ecological Restoration	Management	Monitoring	Land Use Stewardship	Improvements (non-restoration)
Zone A1 - Critical Management Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zone A2 - Primary Protection Zone	Maybe	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zone A3 - Secondary Protection Zone	No	Maybe	Yes	Maybe	No	Yes	Maybe	Maybe
Zone B - Stewardship	No	Maybe	Maybe	Maybe	No	Maybe	Maybe	Maybe





Septic/Stream Conflicts

Lots with septic less than 2 acres

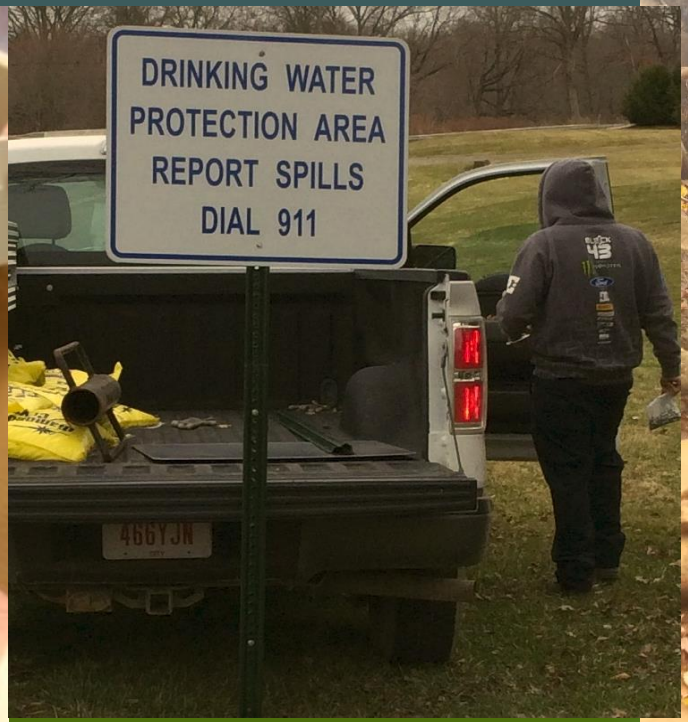
Lots with septic less than 2 acres within 100 feet of a riparian stream system

Riparian Zone

Classification	Acreage	Percent
Cultivated Crops	1,097.59	7.1
Deciduous Forest	7,253.42	46.7
Developed, Low Intensity	96.41	0.6
Developed, Medium Intensity	23.83	0.2
Developed, Open Space	449.04	2.9
Emergent Herbaceous Wetlands	85.82	0.6
Evergreen Forest	215.80	1.4
Grassland/Herbaceous	378.58	2.4
Mixed Forest	11.83	0.1
Open Water	3,346.50	21.6
Pasture Hay	549.60	3.5
Shrub/Scrub	80.03	0.5
Woody Wetlands	1,933.06	12.5
total	15,521.51	100.0

** Calculated total from this data set may not match actual parcel data*

- **Akron's Watershed Control Program:**
  - Source Water Area Monitoring
  - Sampling: Stream, Reservoir and Canoe
  - Wildlife Population Control on Akron Properties
  - Watershed BMPs
  - Education and Collaboration

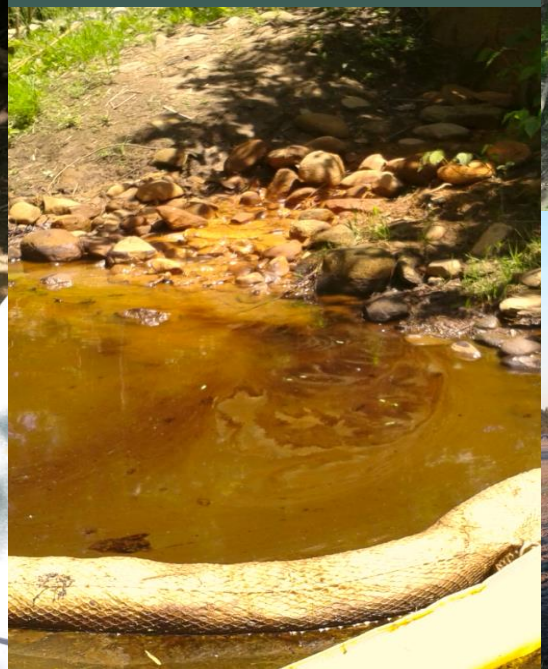


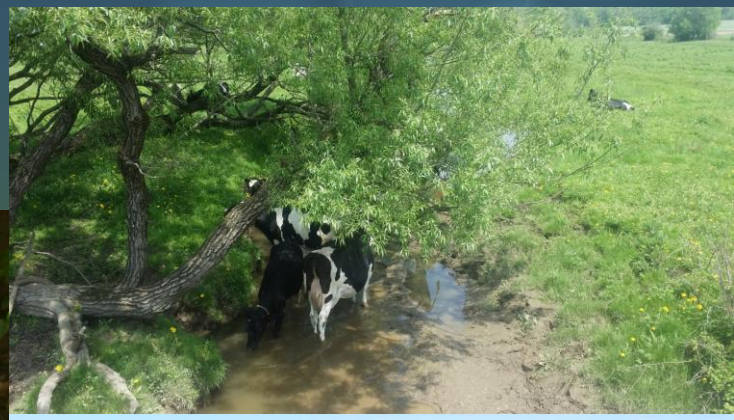
Source Water Area Monitoring Program (SWAM)

- Regular monitoring of potential pollution sources
  - HAZMAT
  - WWTP
  - Agriculture
  - Industrial/construction
  - Other identified sources

Additional Monitoring:

- EPA approved Bio-solids application sites (spring and fall)
- Watershed Agriculture
- Akron properties leased for agricultural use





- Municipal/County operated
- Mobile Home Park operated
- Industrial
- Other/private

AUBURN CORNERS WWTP

BURTON LAKES WWTP

INFIRMARY CREEK WWTP

NPDES Permitted Bio-solid farm field application (You probably should just not think about it…)

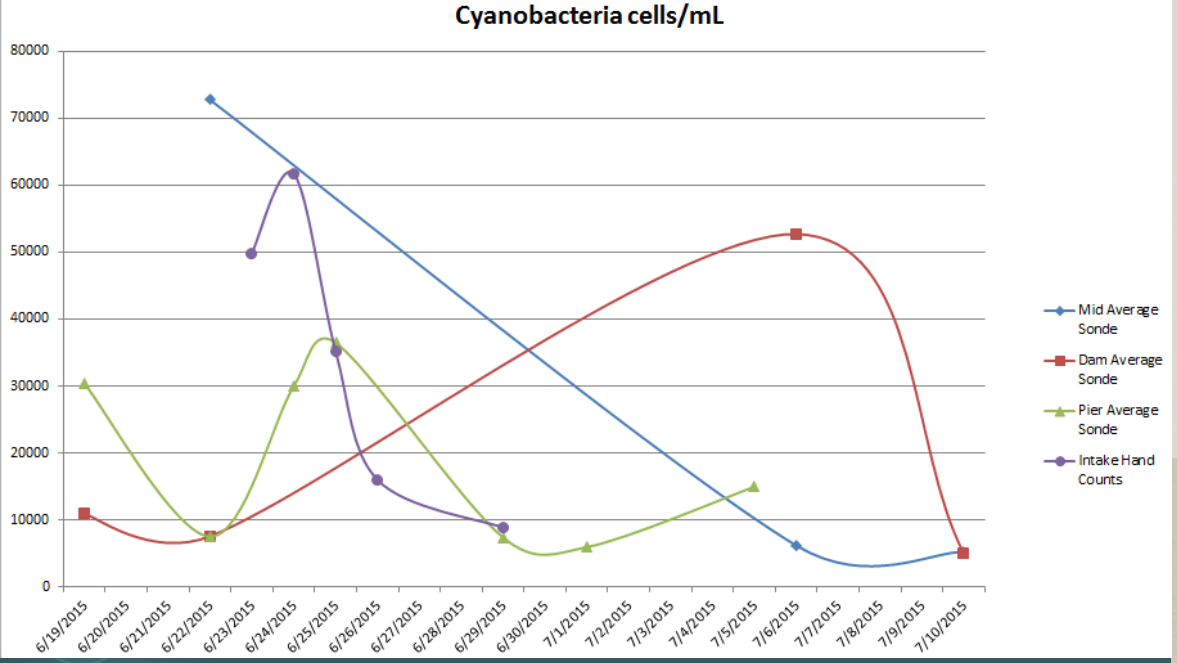
68 farm fields with NPDES permits for bio-solid spreading in Upper Cuyahoga River Watershed.

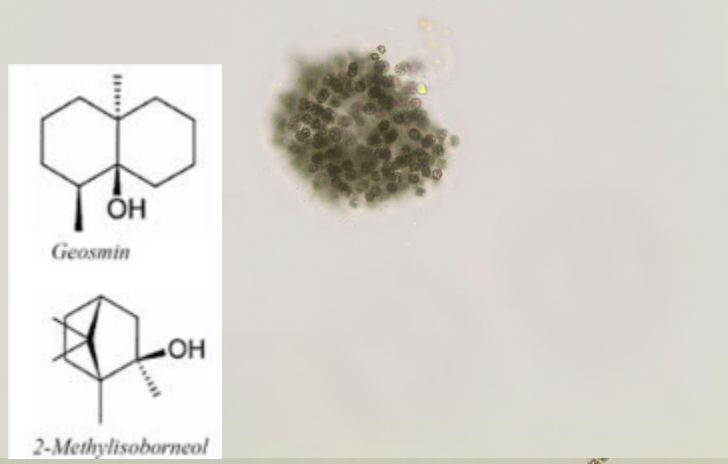
Only 5 actively spread.

Stream and Canoe Sampling

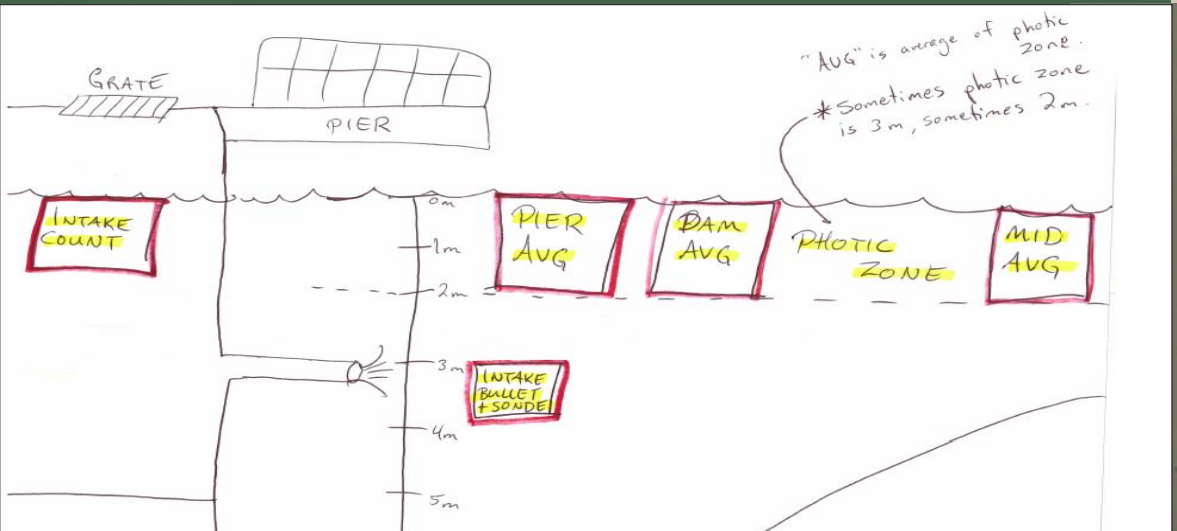
- 19 Stream Sample Sites and a lot of canoe sampling:
  - Temp, pH, DO, SS, P, NO_3, NH_3, *E. coli*, fecal coliform

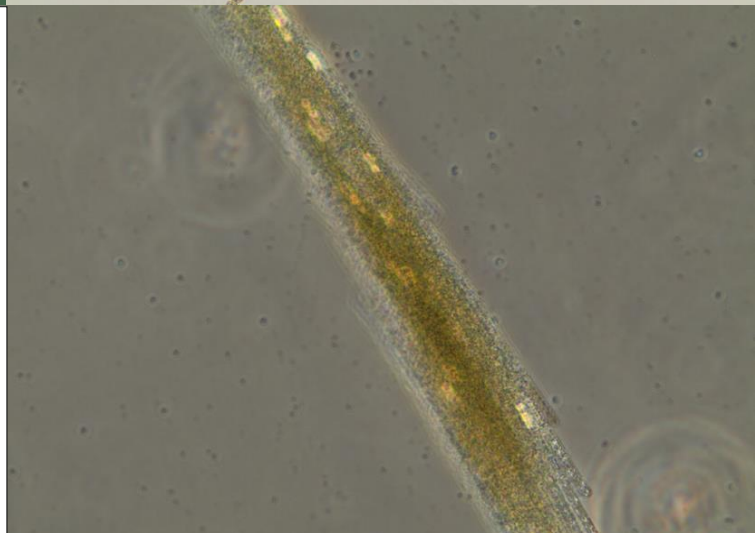
Stream and Reservoir Sampling



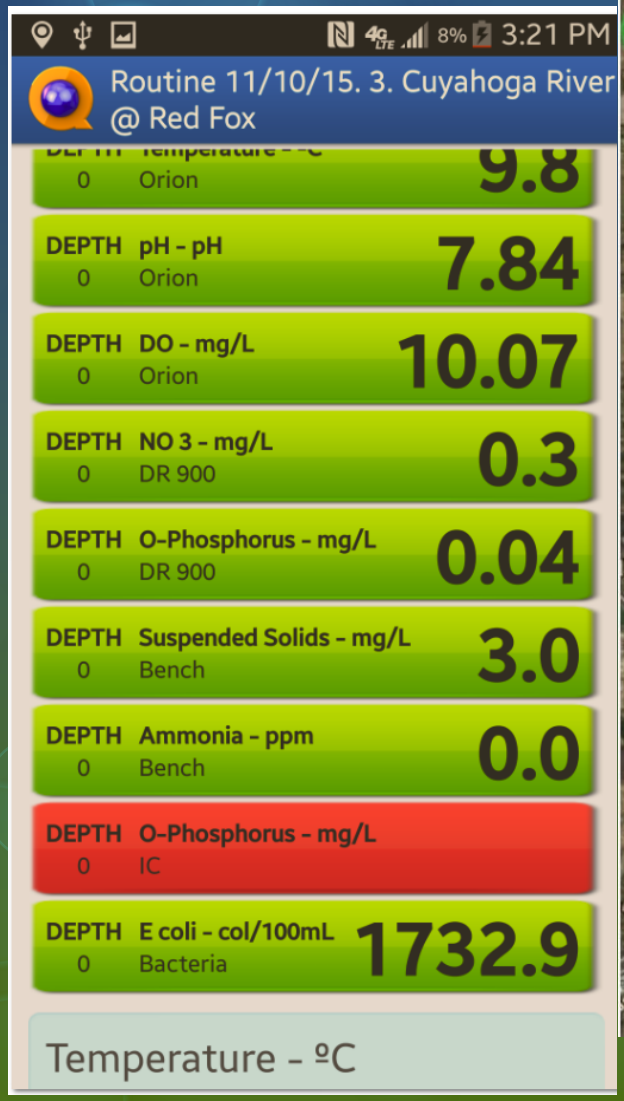


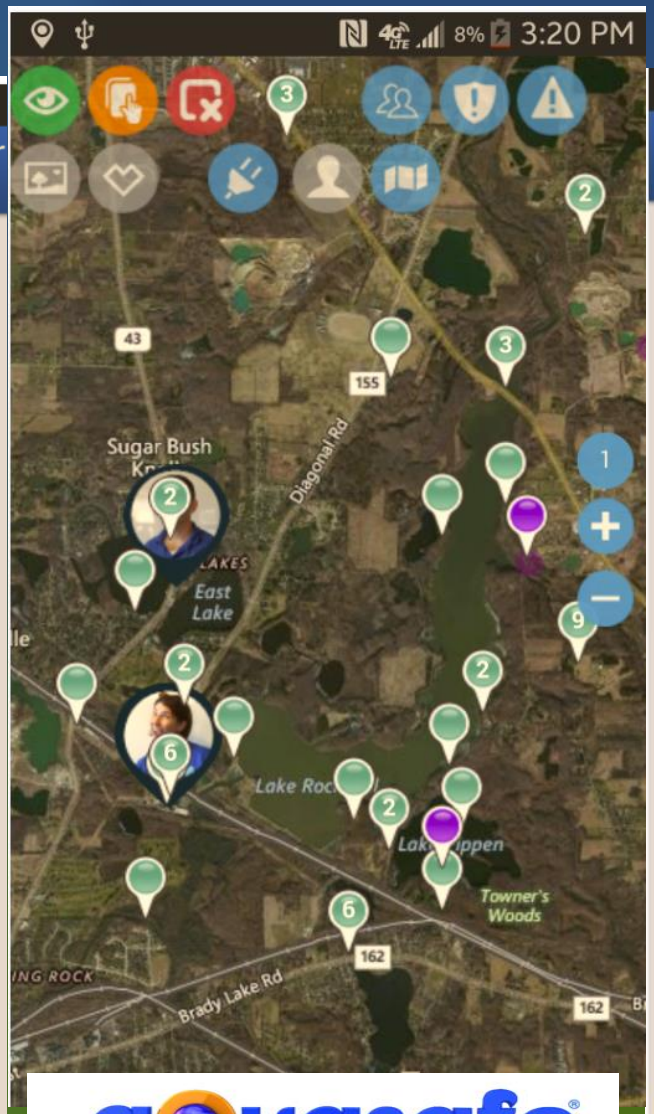
It's not just about getting to go out on a boat…





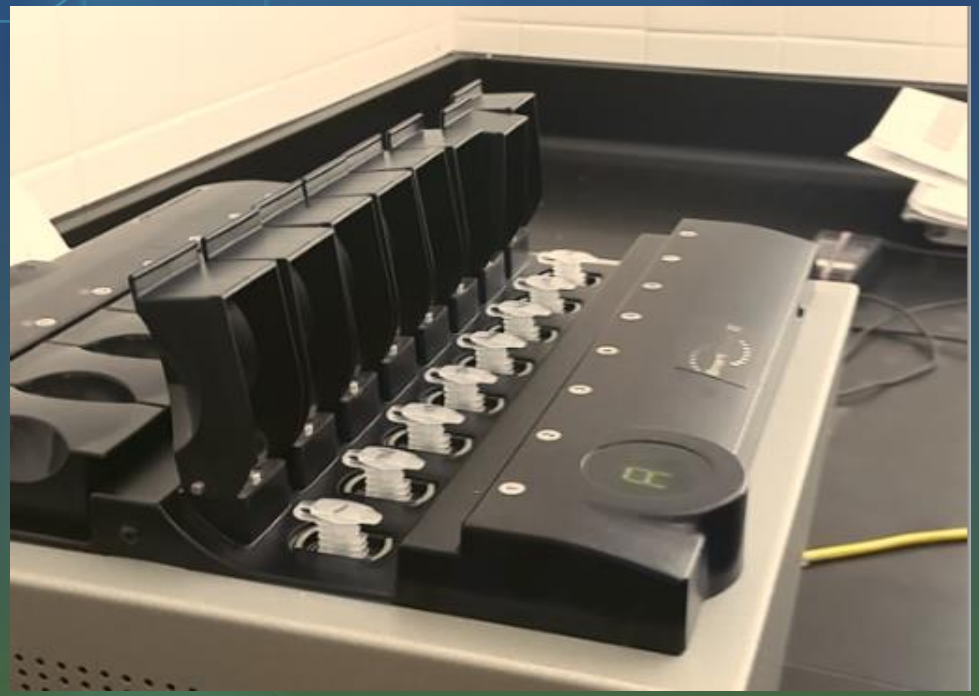
Akron HAB Special Projects: aQuaSafe





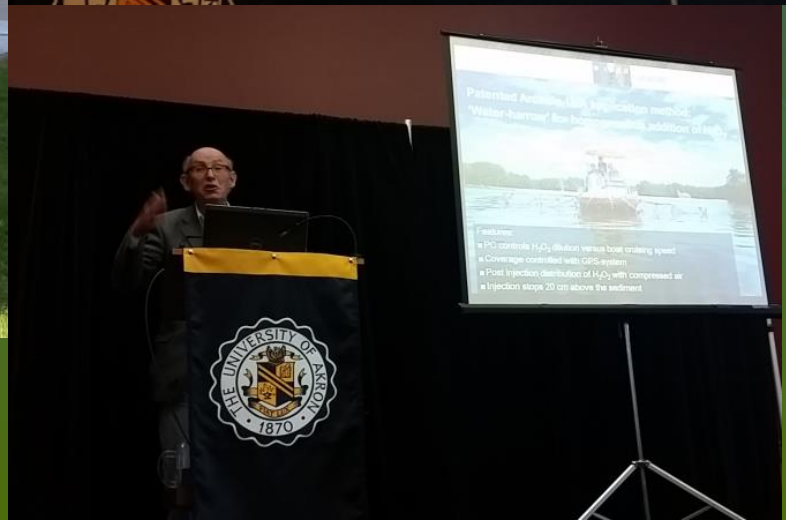
aquasafe
INTELLIGENT WATER MANAGEMENT PLATFORM

Akron HAB Special Projects



- Current HAB monitoring utilizes visual cyanobacteria identification.
- Toxic potential can vary, even within species.
- PCR allows more accurate risk assessment by counting the number of genes responsible for toxin production.

International Algal Toxin Conference 2015



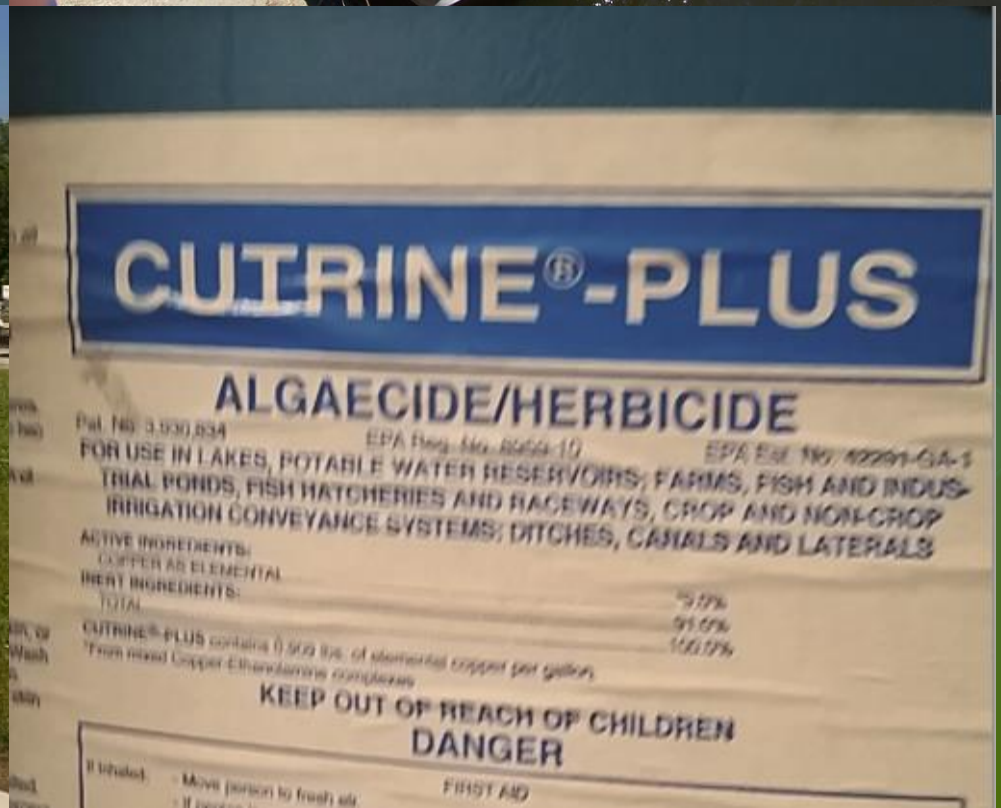
Akron HAB Special Projects: BlueLeg Monitor WISP3: “The algae gun”

BlueLegMonitor
Spot on water quality

Akron HAB Special Projects: Ohio Sea Grant "Evaluation of Optimal Sources and Dosages fro Ohio Drinking Water Sources"

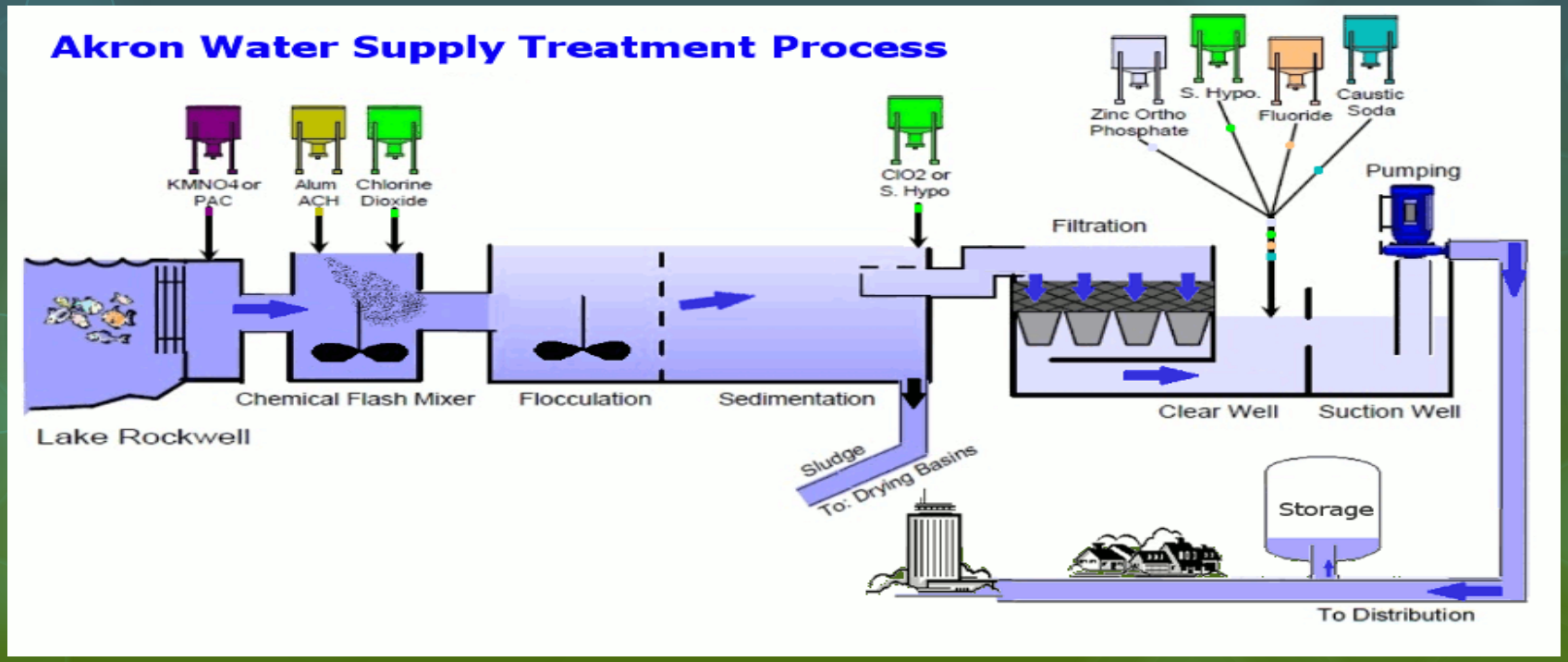
Akron's Response: Using Algaecide

Copper Sulfate
40,000 c/mL or less



Akron's Response: Optimizing Conventional Treatment

- Conventional treatment= @95% removal
- $KMn0_4$, Carbon, Coagulation, Carbon, Chlorine



Thanks!