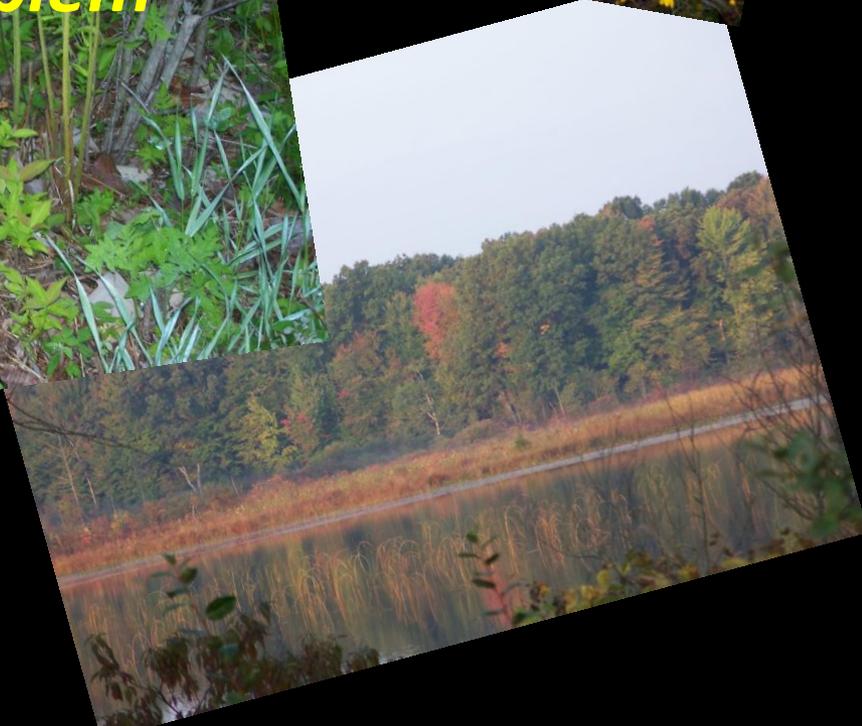


# Manure in Water

*A Real Problem*



*Each photograph in this presentation was taken by an ECCSCM member, with aerial assistance provided by Lighthawk/Sierra Club/SRAP.*

*All these pictures were taken locally.*

*This presentation belongs to  
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*[www.nocafos.org](http://www.nocafos.org)*

# Manure equivalent per day: 1 cow = 20 people

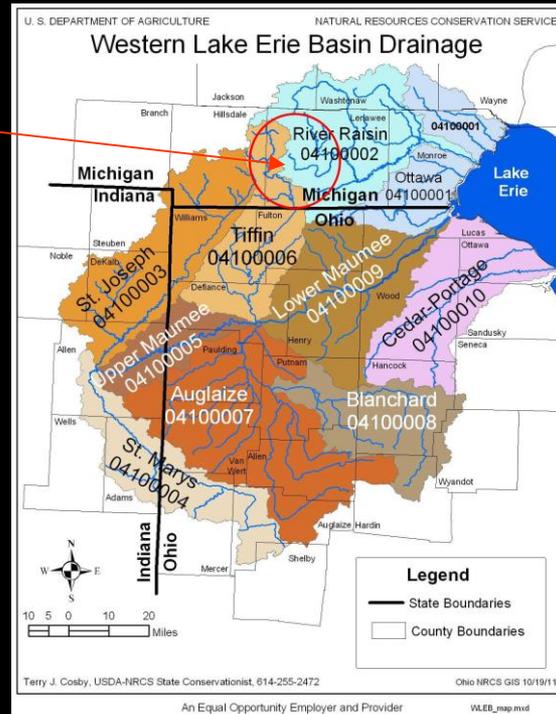
The factory farms in the Lenawee/eastern Hillsdale County part of the Western Lake Erie watershed produce as much manure/waste as the City of Boston.  
Each day.

The Great Lakes have HAB problems, especially Lake Erie.

Answers are everywhere. But are we asking the right questions?

**ECCSCM monitors 41 edge-of-field sites - where 13 factory farms produce, store and apply manure in 19 Michigan townships - for E. coli, dissolved oxygen, temperature, BOD, nitrates/nitrites, phosphorus (PO4 mostly), and ammonia. Nutrient and bacteria levels peak during the spring thaw, late spring/early summer after heavy rains, just after post-harvest manure application, and late fall when lagoons and farm stockpiles are cleaned out before winter. This is flushed downstream in pulses over the year – strongest during late winter and early spring.**

ECCSCM Test Area



# What Are the Numbers?

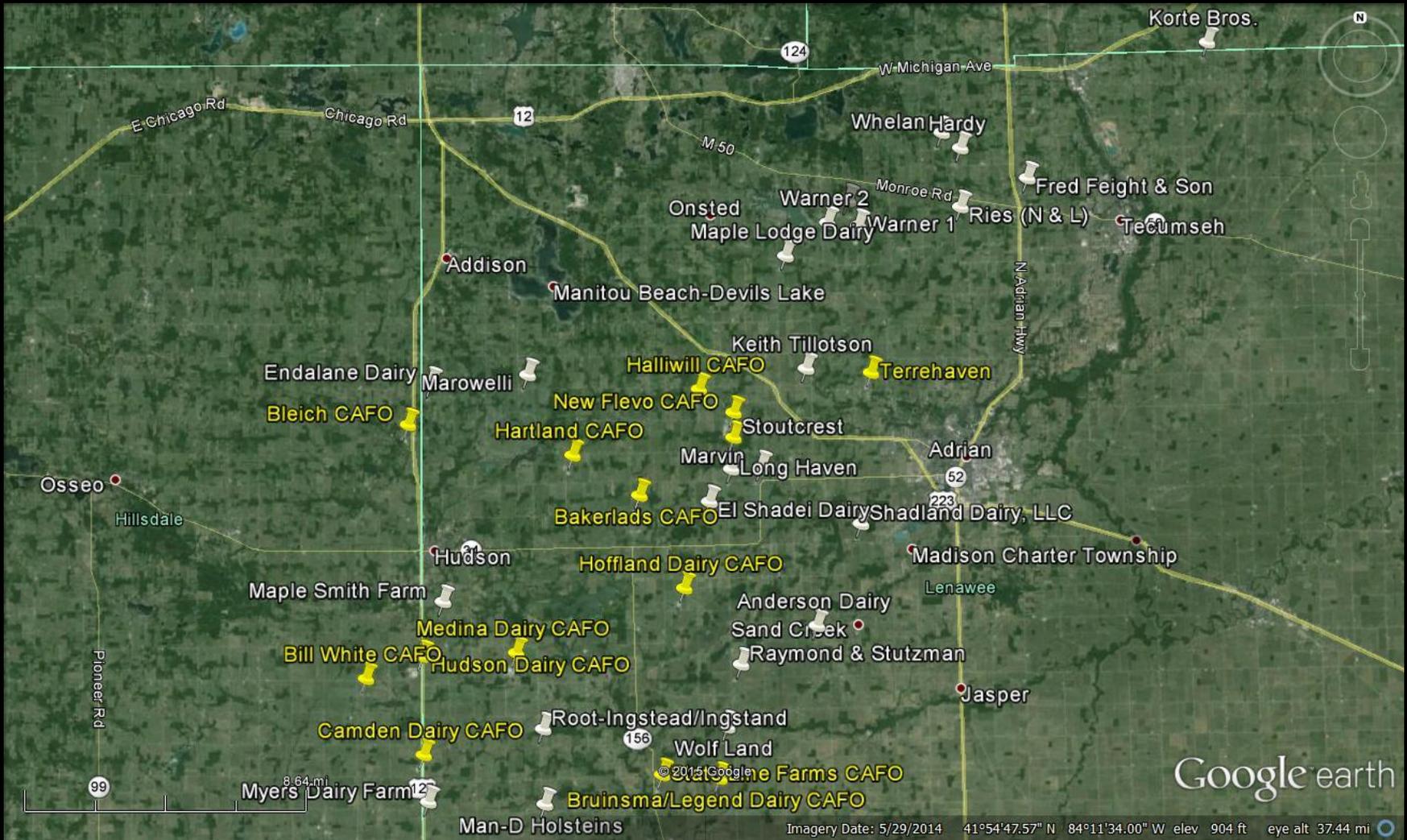
- In 2014, there were 11 million CAFO animals in the Raisin and Maumee watershed portions of the Western Lake Erie Basin (OH/MI, does not include IN). Annually, these 70 farms produce about 5 billion lbs. of manure and waste each year. This waste contains about 22 million lbs. of P2O5.
- In 2014, there were 42,000 CAFO animals in 15 factory farms in the Lenawee/Hillsdale portion of those watersheds, which produce nearly 1.6 billion pounds of manure and waste.
- Scientists say around 70-80% of the phosphorus in Lake Erie now comes from agricultural runoff. Anywhere from 10% to 30% comes from livestock manure/waste. Maybe more, depending on whose data was used.
- In 2013-2014, the Lenawee area alone had:
  - 34,663 CAFO animals in
  - 13 factory farms, which store waste in
  - 56 lagoons, and which produce
  - 163,827,000 gals. of liquid waste and 143,600,000 lbs. of solid waste; about 1.5 billion lbs. in all. This comes mostly from dairy cows; some from swine.

Sources for animal count and waste production: MDEQ FOIA NPDES/CNMP Annual Reports 2013, Sec. 2, Line b – Michigan; OH Dept. of Agriculture [http://www.agri.ohio.gov/apps/lepp\\_permits/dlep\\_permits.aspx](http://www.agri.ohio.gov/apps/lepp_permits/dlep_permits.aspx) - Ohio; *Animal Manure Data Sheet* (USDA), Ronald E Hermanson, Ph.D, P.E., and Prasanta K. Kalita, Ph.D, University of Washington [http://agrienvarchive.ca/bioenergy/download/animal\\_man\\_datasheet\\_wsu.pdf](http://agrienvarchive.ca/bioenergy/download/animal_man_datasheet_wsu.pdf)



# 13 Factory Farms in Lenawee/Eastern Hillsdale Counties, 2014

Sources: MDEQ public records



# 37 Livestock Farms in Lenawee/Eastern Hillsdale Counties

Source: Phone books, online social media, records of taxpayer-provided subsidies open to public

# What's in CAFO waste?

CAFO waste can contain hormones, antibiotics, chemicals used in livestock care, milkhouse waste, cleaning agents, heavy metals, silage leachate, bacteria such as E. coli (including O157:H7) and salmonella including antibiotic-resistant forms, giardia, c. diff, cryptosporidium, and MRSA. Its emissions are hydrogen sulfide, ammonia, and particulates.

Nutrients found in CAFO waste include nitrogen, ammonia, and phosphorus.

*Especially phosphorus ...*

# Methods of Application



Much of the phosphorus in liquid manure is already dissolved while it's in the lagoon, and before it leaves the producing facility.



It all starts with the tiles ... 30 ft. apart, 18" or deeper, underground. Many of these private systems are unmapped. Sub-surface field tiles drain to streams.



Manure/waste applied on 6.17.14 when there was a 94% chance of  $\geq \frac{1}{2}$ " rain within 12 hours, but only a 19% chance of noticeable precipitation within 24 hours. Surface runoff drained into catch basins and then into tiles and streams after 1.5" rainfall on 6.17-18.14. Samples taken by ECCSCM on 6.19.14 showed E. coli = TNTC, nitrates = 20 ppm, nitrites = 1.5 ppm, PO4 = 30 ppm, ammonia = 1 ppm. MDEQ was notified on 6.19.14 a.m.

Manure/waste applied to snow or frozen ground runs off, or it can flow directly through tiles, into surface water. These same conditions and systems exist in a large part of the Western Lake Erie watershed in Ohio. \*



\*Horstman, Janelle, BGSU, "[The Effects that Liquid Manure and Solid Cattle Manure Have on the Water Quality of Drainage Ditches in Putnam Co, OH](#)" (Honors Project, 2014)

And it runs through the tiles below-ground directly to the streams and rivers, even if there's a cover crop or a grass barrier on the surface, or a constructed wetland. Even on no-till fields\*\*, through macropores in our heavy clay, and even through swampy soil.



\*\*Green, David, "Frank Gibbs: Liquid Manure is Too Wet", *State Line Observer*, Morenci, MI, Aug. 20, 2006 (Field Demonstration in Lenawee County)

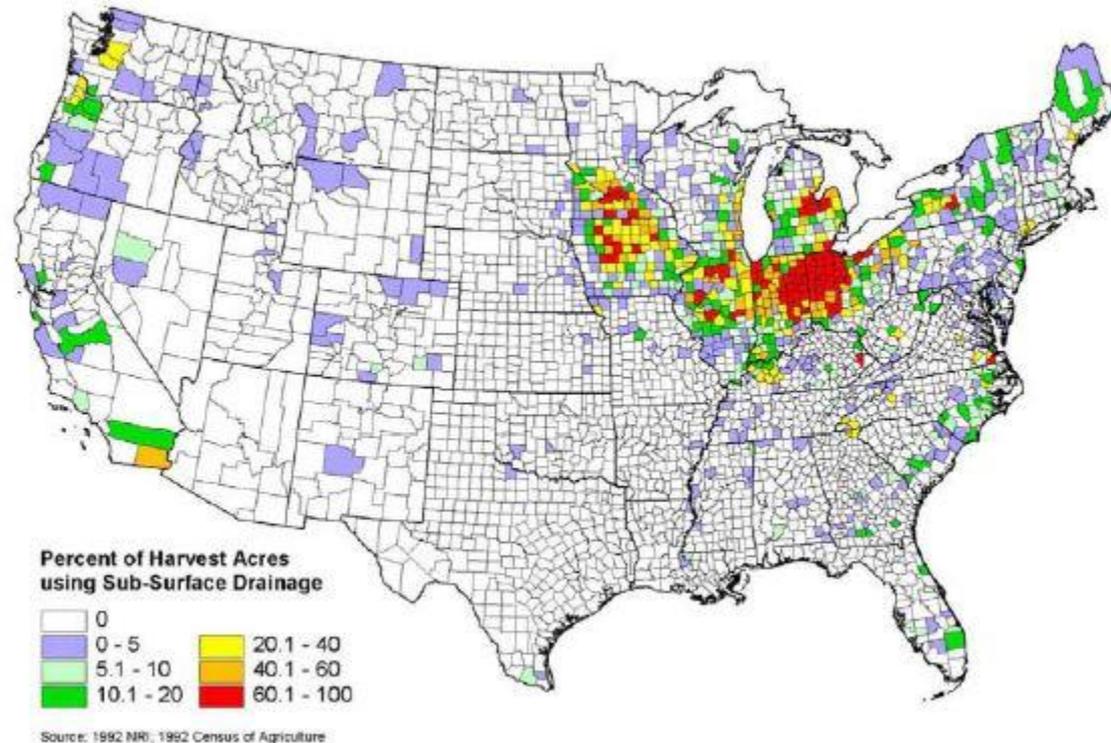


Figure 28 — Percent of harvest acres in the United States using subsurface drainage in 1992.  
(NRI Census of Agriculture, 1992)

From the Ohio Lake Erie Phosphorus Task Force Final Report – 2010, this 1992 NRI Census of Agriculture map shows areas with subsurface drainage. According to some experts, tile drainage is responsible for around 40% of the DRP in a small watershed.\*\*\*

\*\*\*Notes, Agricultural Drainage Management Systems Task Force meeting, Dundee, MI April 17-19, 2012, p. 4

Accidents and over-application often happen.





August, 2013



March, 2014

03/11/2014



April, 2014



March 2015

03.11.2015 14:19



March, 2015

03.11.2015 14:19

Almost all CAFOs in our area have used one or more USDA/NRCS/MAEAP voluntary practices for many years, ranging from cover crops, grassy strips, buffers, setbacks, tile plugs, to constructed wetlands. From April, 2013 through October, 2014, results of edge-of-field water tests in the Lenawee/Western Hillsdale parts of the Lake Erie Watershed show:

- 74% (75 of 101) of the samples collected met or exceeded the MI water quality standard of 130/100mL for total body contact, E. coli
- 33% (33 of 101) met or exceeded the MI water quality standard of 1000/100mL for partial body contact, E. coli
- 63% (39 of 62) met or exceeded the MI water quality standard of .10 mg/L, ammonia
- 34% (30 of 88) fell below the MI water quality standard of 5.0 mg/L, dissolved oxygen (DO)
- 22.5% (14 of 62) met or exceeded the MI water quality standard of 10 mg/L, nitrates
- 100% (70 of 70) were above .1 mg/L, and 96% (67 of 70) met or exceeded the MI water quality point discharge standard of 1 mg/L for phosphorus. Levels above .1 mg/L are of concern for aquatic life. Safe levels for aquatic life in natural streams are below .05 mg/L.

## For now ...

- NPDES permits and renewals must be carefully analyzed before issuance; all inspections must include water tests; regulations must be strictly enforced. Penalties must be given when violations occur.
- Requirements:
  - No manure on snow/frozen ground/saturated ground. No exceptions.
  - No manure at any time before precipitation within 24 hours of a 50% chance of  $\geq \frac{1}{2}$ " forecast, or during a precipitation event of any kind.
  - Soil tests must be required more often than every 3 or 4 years; 150 ppm (STP) is too high. It should not exceed 40 ppm. The right amount of nitrogen in manure, for some crop plans like corn on corn, might mean too much phosphorus.
  - Manure must always be properly incorporated or injected within 24 hours, or sooner if there is a chance of runoff occurring.
  - "No-till" needs to mean "no-till", not conservation tillage or rotational tillage, or any variation.
  - Manifested waste and waste from small farms should fall under the same storage and application requirements as large farms.
- TMDLs still need to be set for some Raisin/Maumee tributaries that were put on the 303(d) impaired waters list for E. coli and CAFO nutrients as far back as 2004.

# **What, Exactly, Do We Know?**

## **Accountability: Models vs. Reality**

*Does the solution fix the right problem?*

**How old is the data used to calculate the animal numbers and farm locations?**

**How are “unpermitted” farms and fast-changing variables, like increasing animal numbers, calculated?**

**Is the right parameter being measured in the field?**

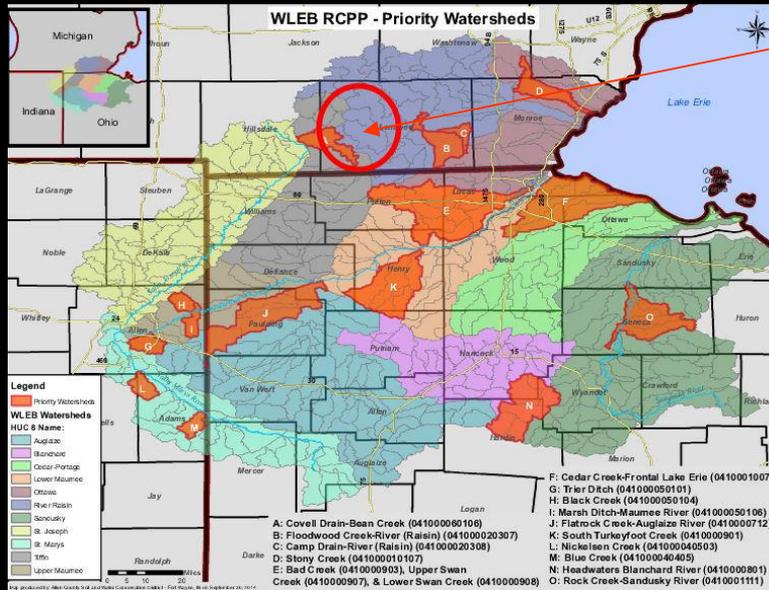
**How are sample collection sites chosen?**

**How far upstream will samples be collected?**

**How frequently will samples be collected? At peak times of year?**

**How do prescriptive practices and remedies – BMPs – in grants address livestock manure application and underground tile drainage systems?**

# WLEB Tri-State Grant = \$55 million



ECCSCM Test Area

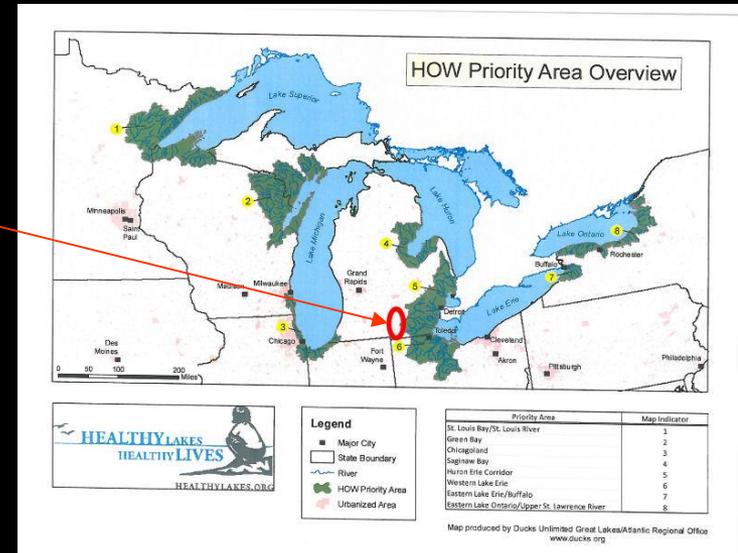


Maybe it's a start ...

# 2015 GLRI \$300 million

# Great Lakes - Healing Our Waters Coalition Freshwater Future Grants, up to \$15,000 ea.

ECCSCM Test Area

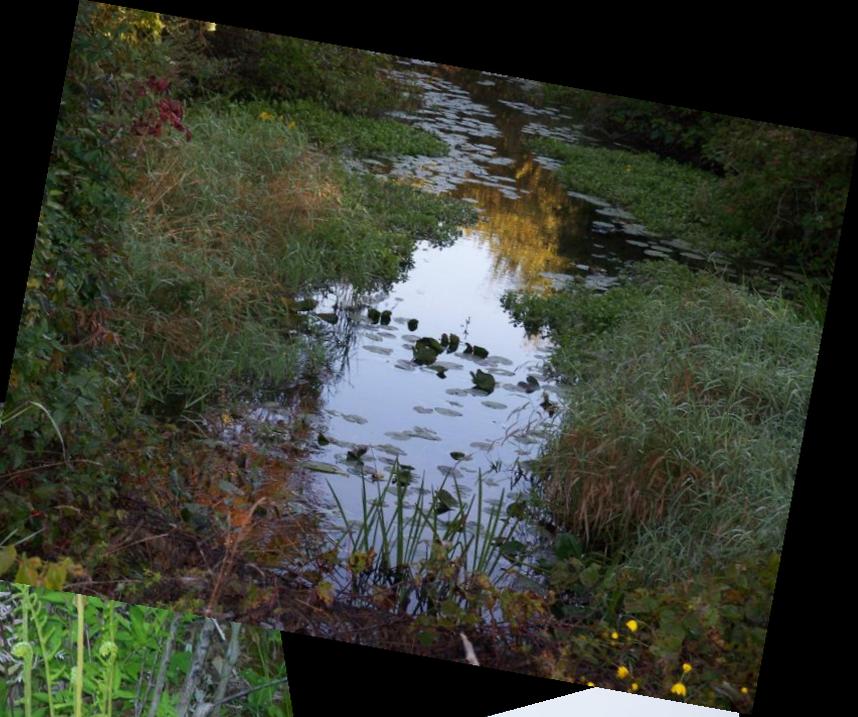


Nothing so far ...

Grant RFPs so far seem to focus on sediment, not the source of phosphorus that's already dissolved when it enters surface water in liquid manure or through tiles.

# Thoughts in closing ...

1. It doesn't matter where the DRP comes from or how much comes from each source; it all needs to be reduced.
2. Livestock manure/waste applications, especially on snow or frozen or saturated ground or involving tile drainage systems (MI/OH), need attention if a 40% reduction in DRP is to be achieved in Lake Erie.
3. The best solution fixes the problem at the source.



Photos: *Lenawee County Wetlands*  
Located in the River Raisin Watershed