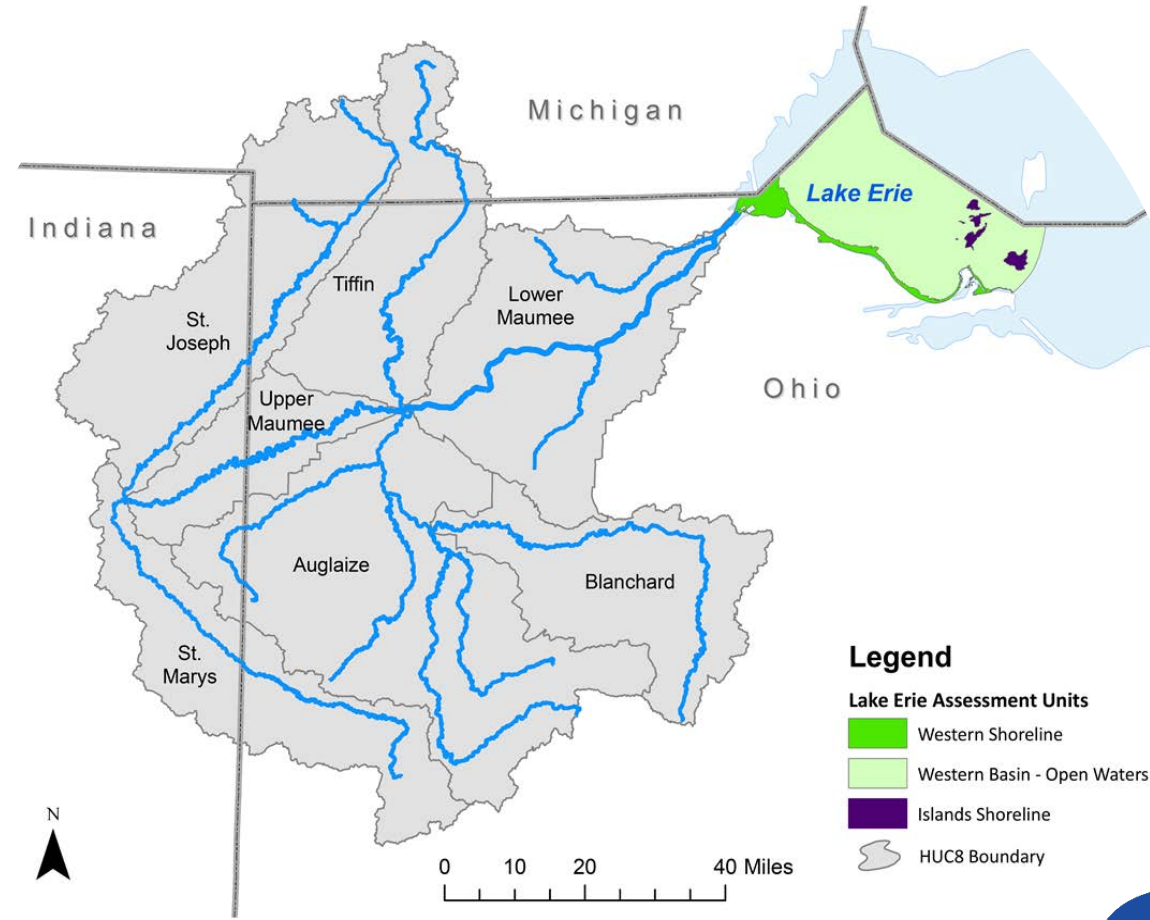


## Addressing Lake Erie Impairments

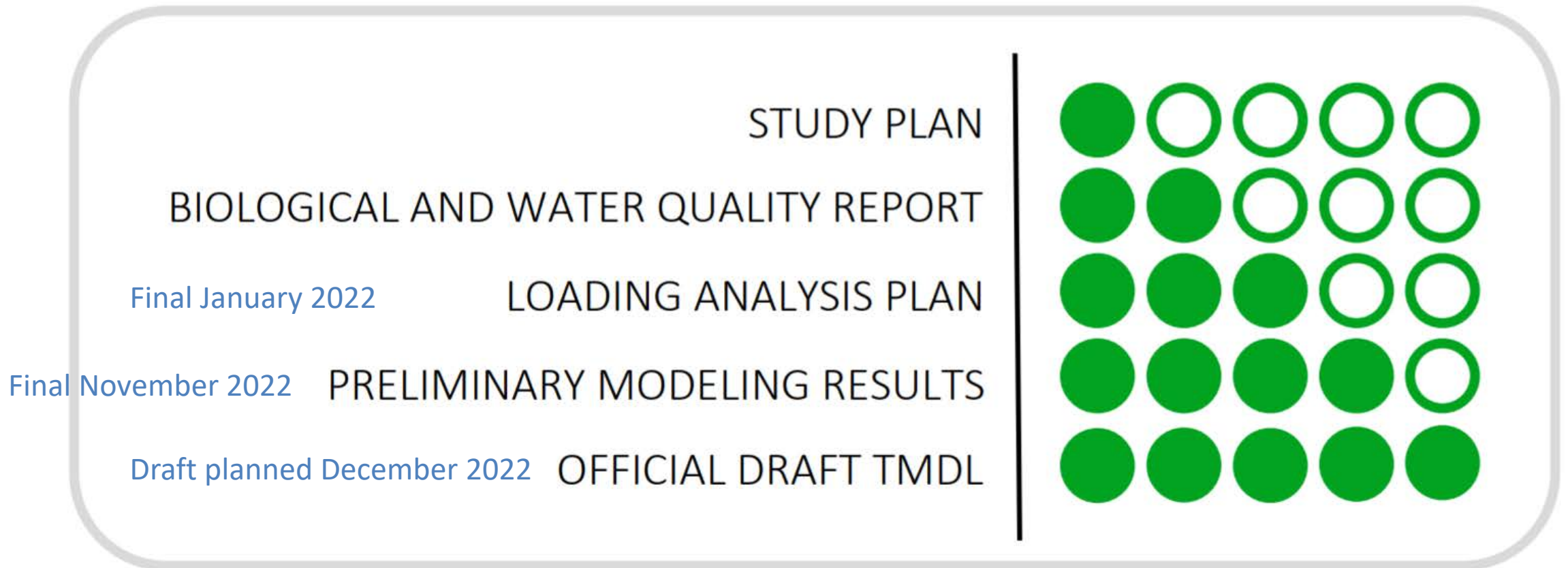
OLEC Quarterly Meeting  
December 7, 2022



# Outline

- Overview of TMDL process
- Overview of Maumee Watershed Nutrient TMDL Preliminary Modeling Results Report
  - Source Assessment
  - Modeling and allocations
  - Preliminary implementation plan

# Ohio's TMDL 5-Step Process



Submit to U.S. EPA for review and approval by June 30, 2023.

# Source Assessment



- Overall Trends
- Additional Information on Major Source Categories:
  - Nonpoint sources
  - Permitted point sources (including stormwater)
  - Household sewage treatment systems
  - Instream Processes

# Source Assessment

## Phosphorus Trends

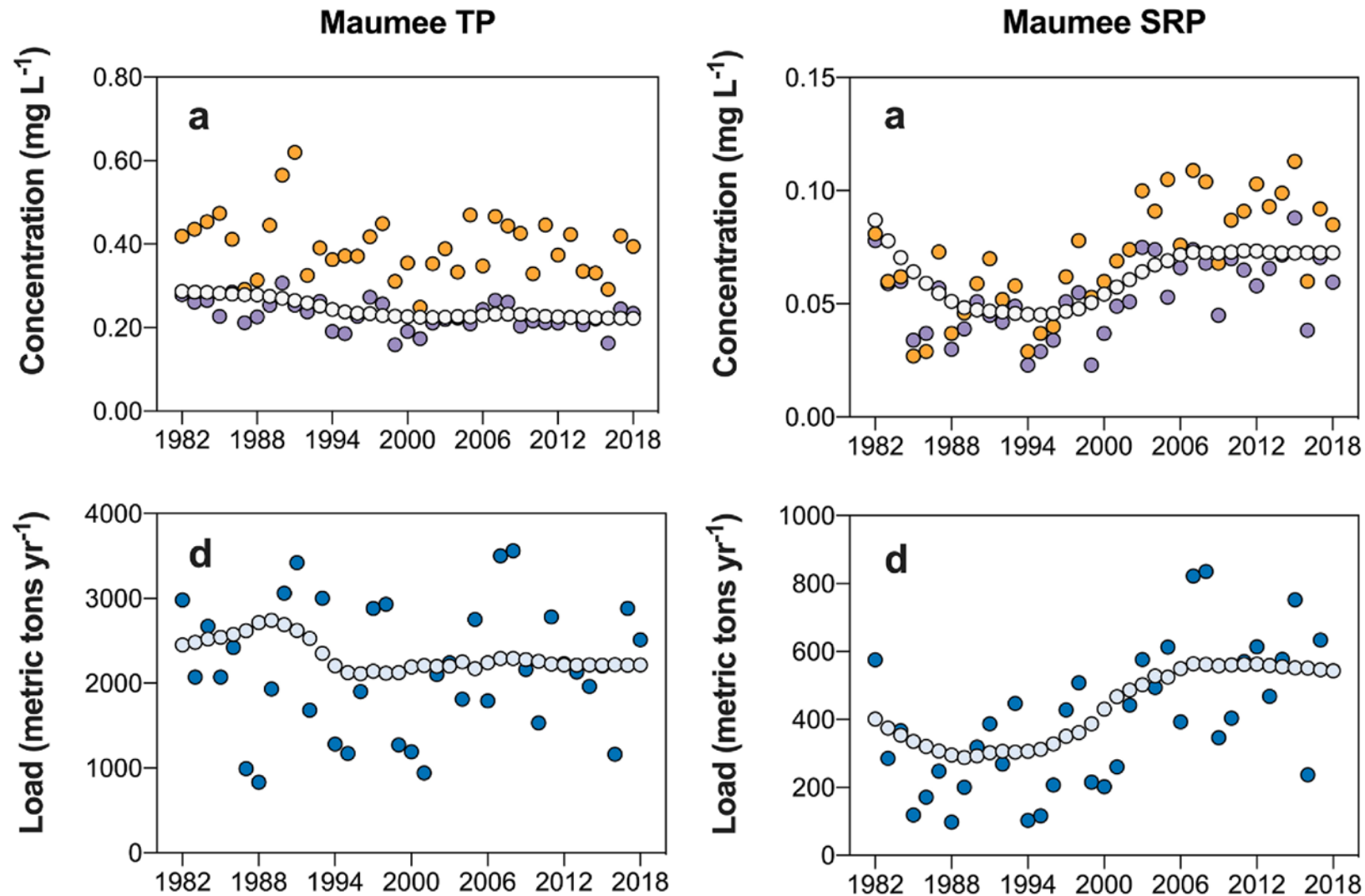
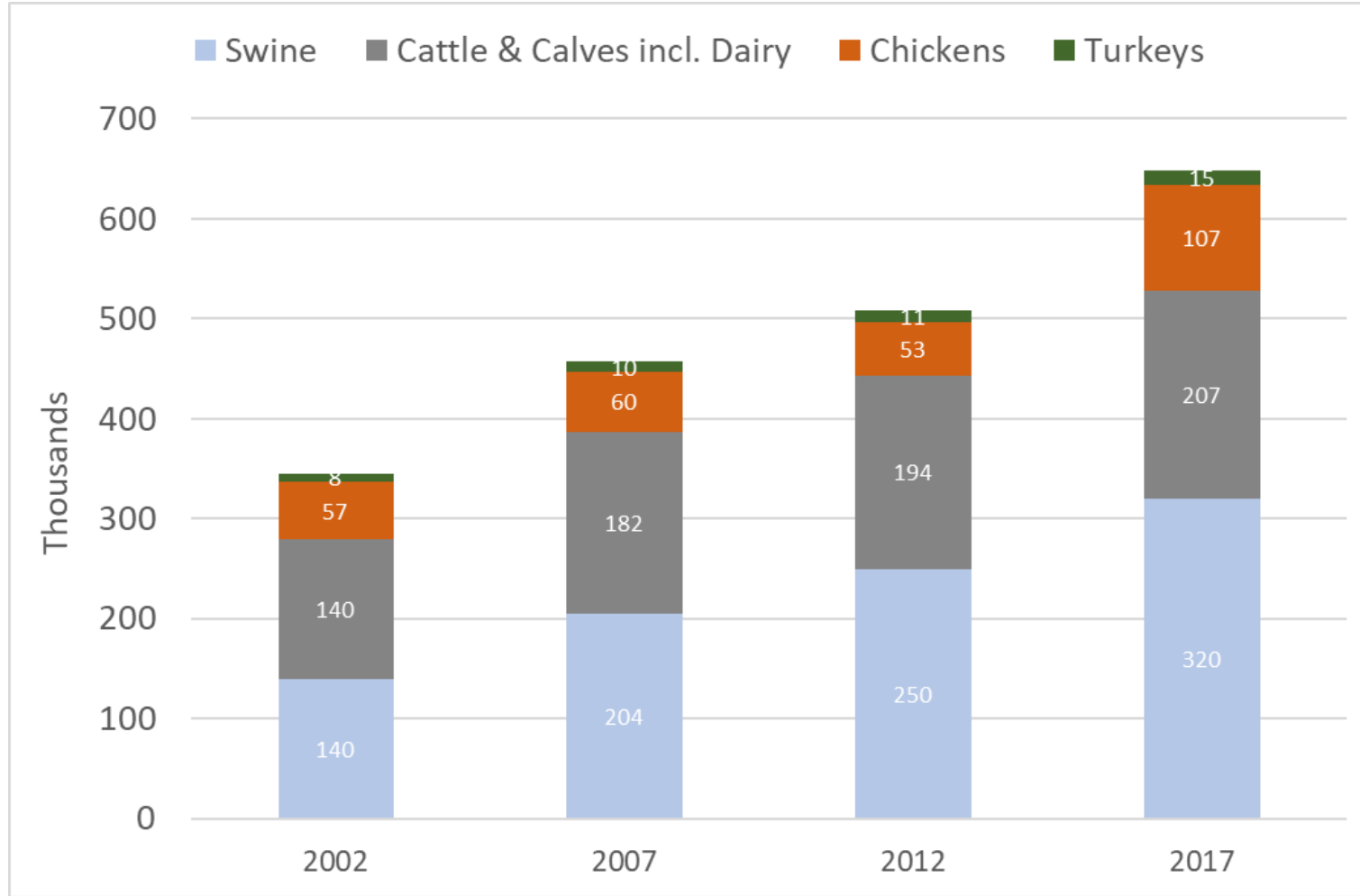


Figure from:  
*Guo, et al. (2021)*

# Nonpoint Sources

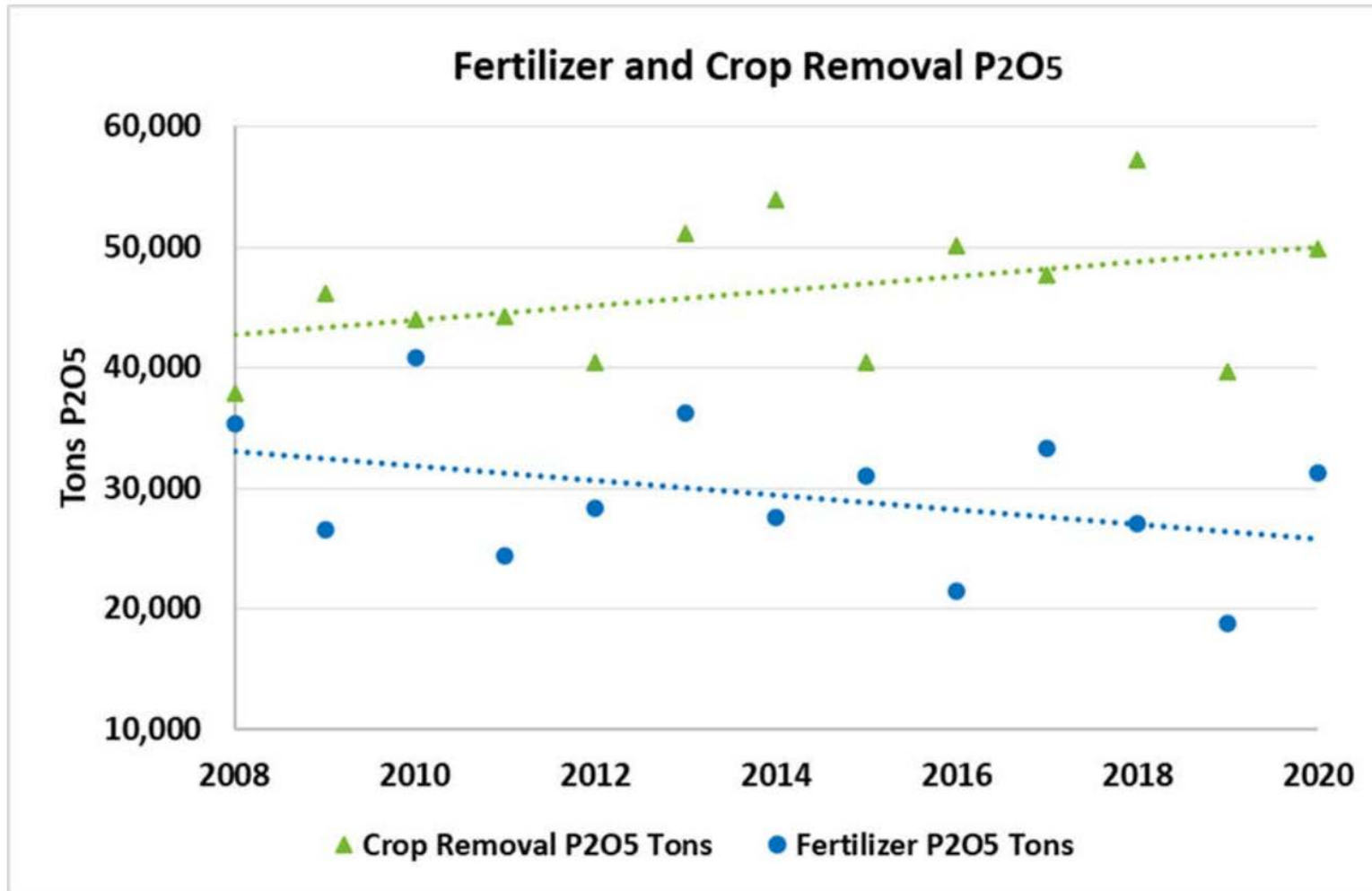
## *Agricultural Fertilizers - Manure*





# Nonpoint Sources

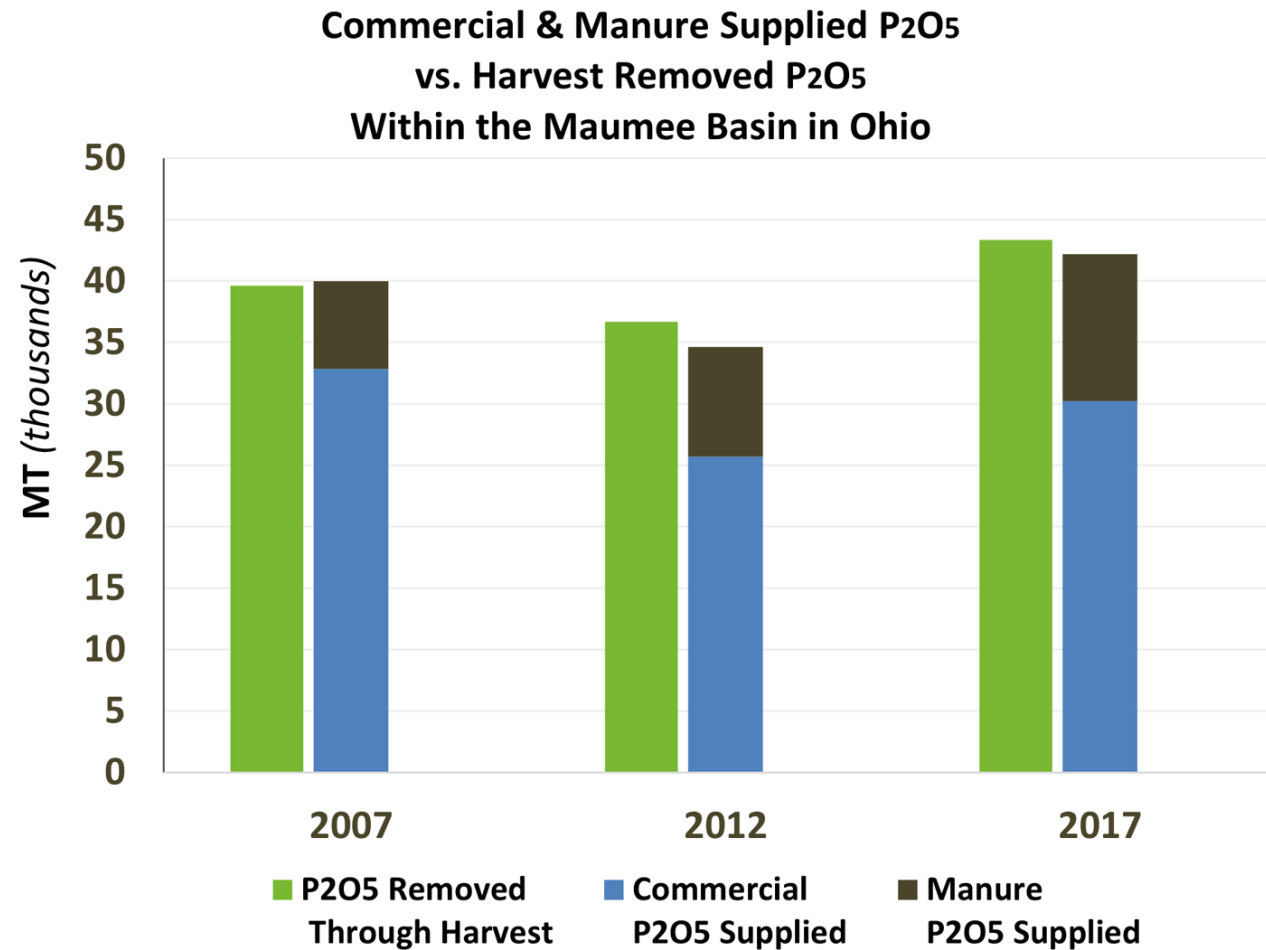
## *Agricultural Fertilizers – Commercial*



- Increasing trend of phosphorus removed by crops.
- Decreasing trend of commercial fertilizer being applied to crops.

# Nonpoint Sources

## *Agricultural Fertilizers - Commercial and Manure*





# Nonpoint Sources

## *Agricultural Soil and Legacy Sources*

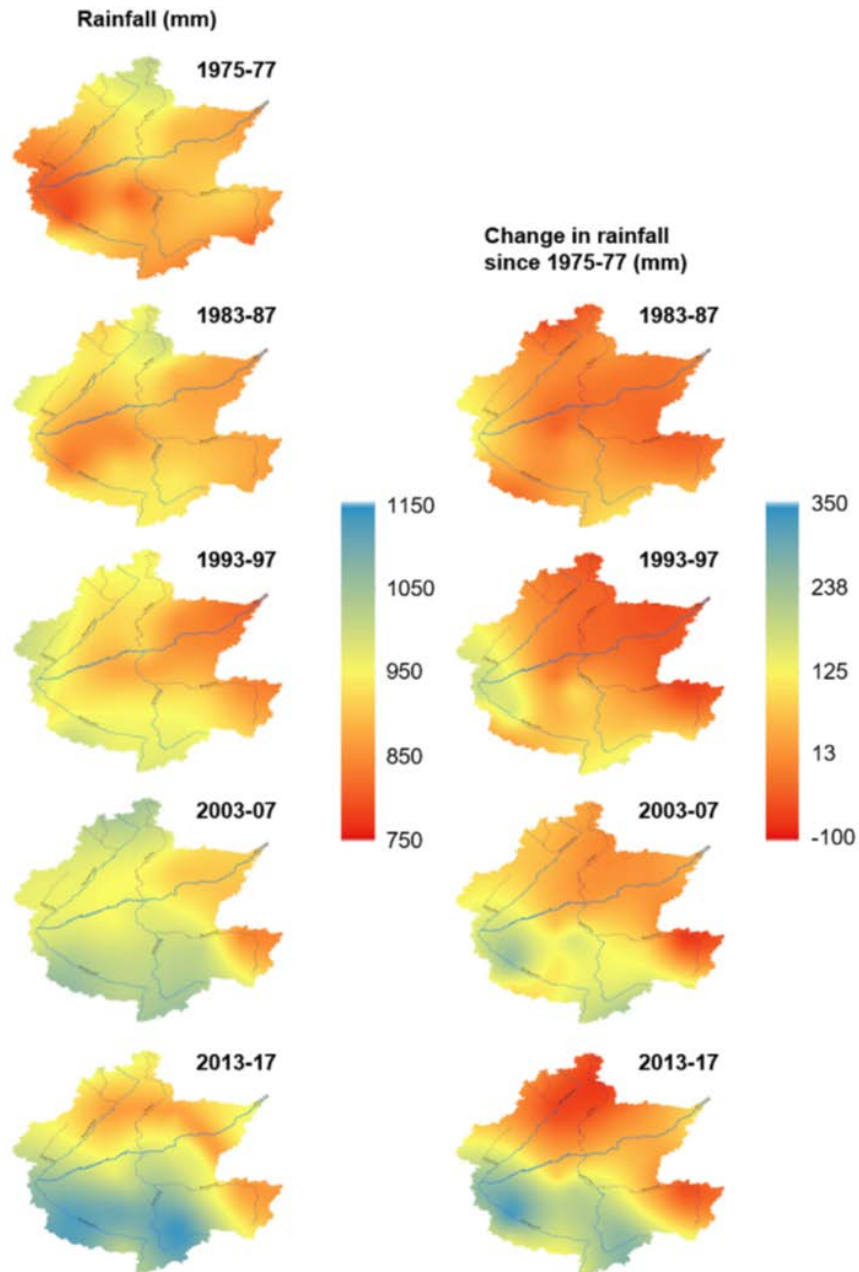
- Erosion and soil loss have declined in the Maumee watershed.
  - Sediment exports to Lake Erie tripled from 1935 to the early 1970s.
  - Efforts focused on reducing sediment – conservation tillage was cost effective.
  - Efforts were successful – USDA – NRCS calculated that by 2012 sediment loss was reduced by over 80 percent.
- Total phosphorus reductions were also achieved because it readily binds to soils.
- Dissolved phosphorus increases were not intended; but were predicted (Logan and Adams 1981).

# Nonpoint Sources

## *Agricultural Soil and Legacy Sources*

- Environmental successes have been identified due to these improvements (Richards et al. 2009 and Miltner 2015).
- Pollution sensitive fish are increasing in NW Ohio streams – especially those sensitive to sedimentation (Ohio EPA 2015a and Ohio EPA 2015b).





# Nonpoint Sources

## *Changes in Watershed Hydrology*

- Increased rainfall ~12 percent and streamflow between 19-32 percent from 1975-2017.
- The increase is greater in the southern part of the Maumee.
- Increases in rainfall came mostly came with heavy and very heavy events.
- DRP export implications.

*Figures from: Williams & King, Water Resour. Res. 56, e2019WR025985 (2020)*

# Nonpoint Sources

## *Sediment and Legacy Sources*

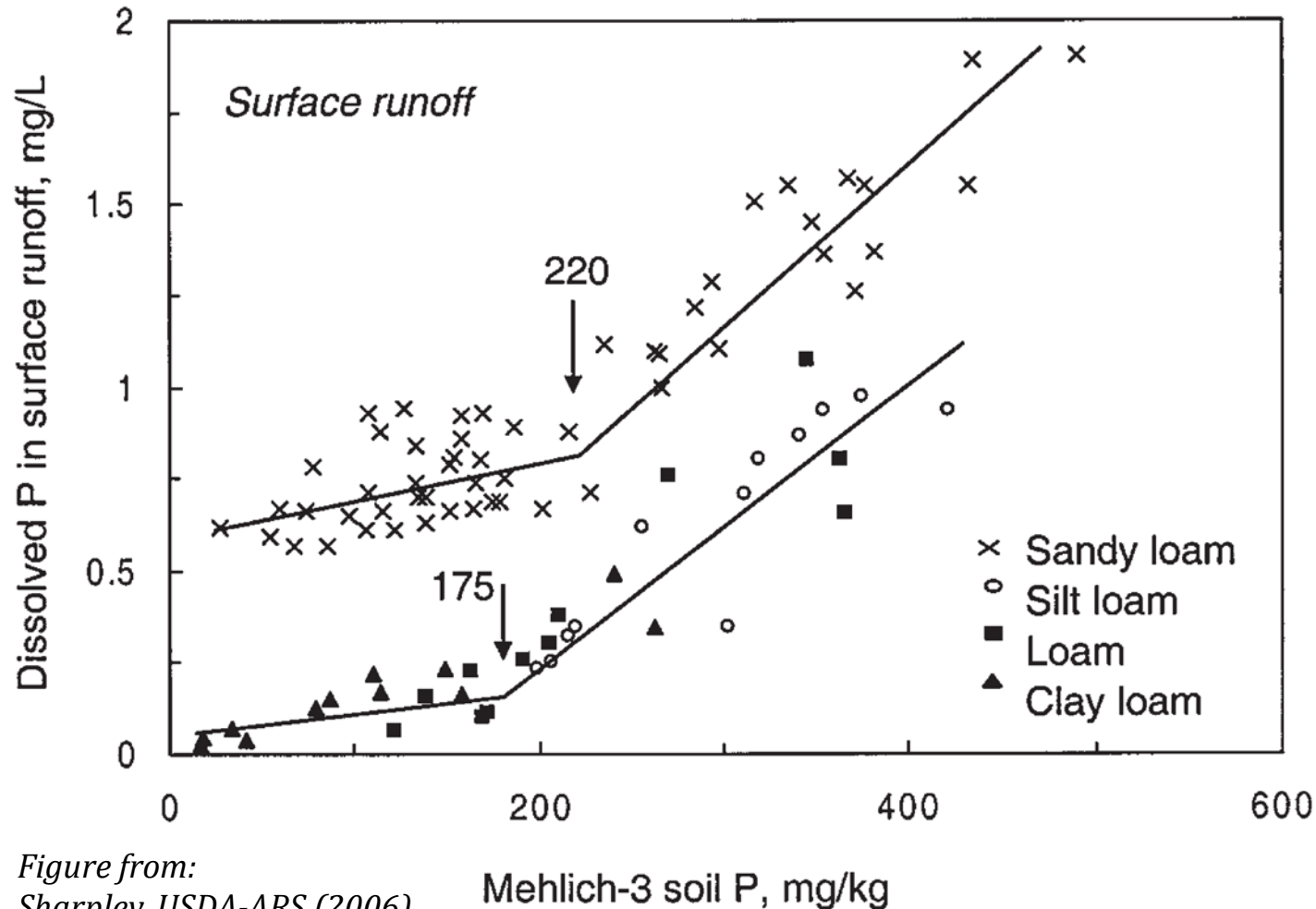
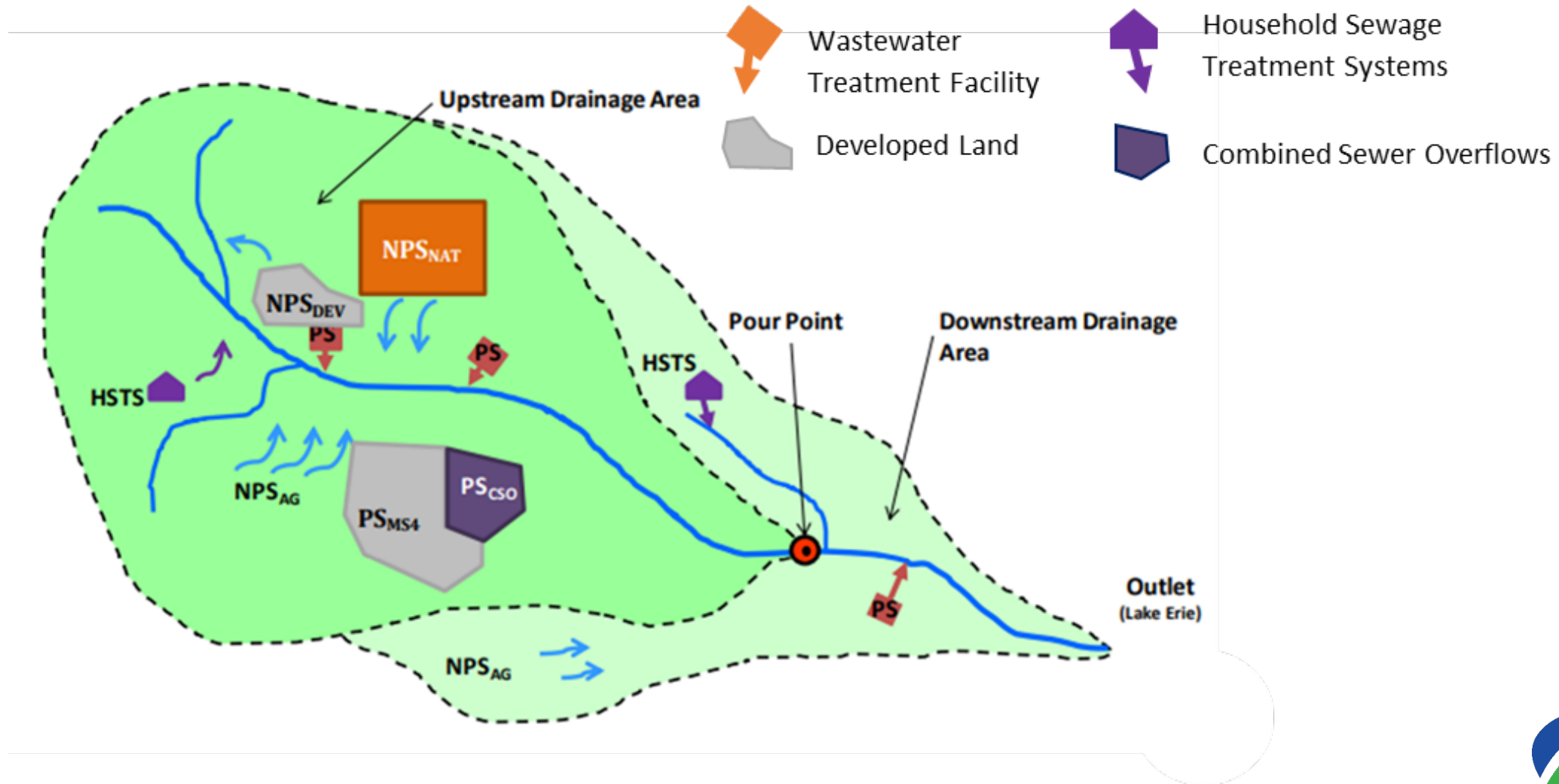


Figure from:  
Sharpley, USDA-ARS (2006)

- Soil properties influence DRP losses (Sharpley 2006).
- Elevated soil phosphorus levels also influence losses (Osterholtz et al. 2020, Dayton et al. 2020, Brooker et al. 2021).
- All agricultural soils contribute total phosphorus and DRP, but some contribute more.

# Methods and Results



# Implement the Strategy

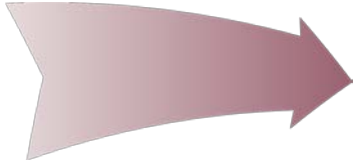
## *Nonpoint Sources – Water Quality Planning*

- Water quality modeling has emphasized the following should be considered during planning efforts:
  - Implementation will need to be widespread.
  - Accomplishing DRP reductions will be more difficult.
  - No single BMP will meet loading targets.
  - Targeting high yielding landscapes is more effective.
  - Emerging practices are likely necessary to meet goals.



## Entire Maumee River watershed

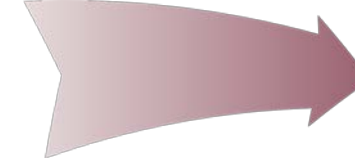
~1,500 Metric Tons  
~3.3 Million Pounds  
2008 Baseline



~590 Metric Tons  
~1.3 Million Pounds  
of Phosphorus Reduction

## Ohio portion Maumee River watershed

~1,128 Metric Tons  
~2.5 Million Pounds  
2008 Baseline



~442 Metric Tons  
~1.0 Million Pounds  
of Phosphorus Reduction

## Ohio portion Maumee River watershed phosphorus reductions\* and implementation

### Point Sources

~5 Metric Tons Reductions



Combined  
Sewer  
Overflows



Stormwater



Unsewered  
Communities

### Enhance Nonpoint Source Sinks

~92 Metric Tons Reductions



Wetlands



Stream  
Restoration



Floodplain  
Reconnection

### Improve Nonpoint Source Management

~366 Metric Tons Reductions



Nutrient  
Management  
(Commercial  
and Manure)



Erosion  
Management



Water  
Management



Emerging  
Technology

\* 3% of Ohio's total allowable load (~21 metric tons) is reserved for the margin of safety. This effectively means that ~21 metric tons additional reductions are required by the allocations.



# Maumee Watershed Nutrient TMDL Project

## Questions?

Maumee TMDL information, updates, FAQs, and webinar recordings, and presentation slides are available on the Ohio EPA Maumee Watershed Nutrient TMDL webpage here:

[epa.ohio.gov/divisions-and-offices/surface-water/reports-data/maumee-river-watershed](http://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/maumee-river-watershed)

Please submit questions, comments, or feedback concerning the TMDL process to [epatmdl@epa.ohio.gov](mailto:epatmdl@epa.ohio.gov)

