



Department of  
Environmental  
Conservation

# **Watershed land use > 25% is a critical benchmark for nutrient loading in NYS Lakes**

*a potential threshold for prioritizing watershed protection*

**NYSFOLA, 2024**

**Presented by: Alene Onion**

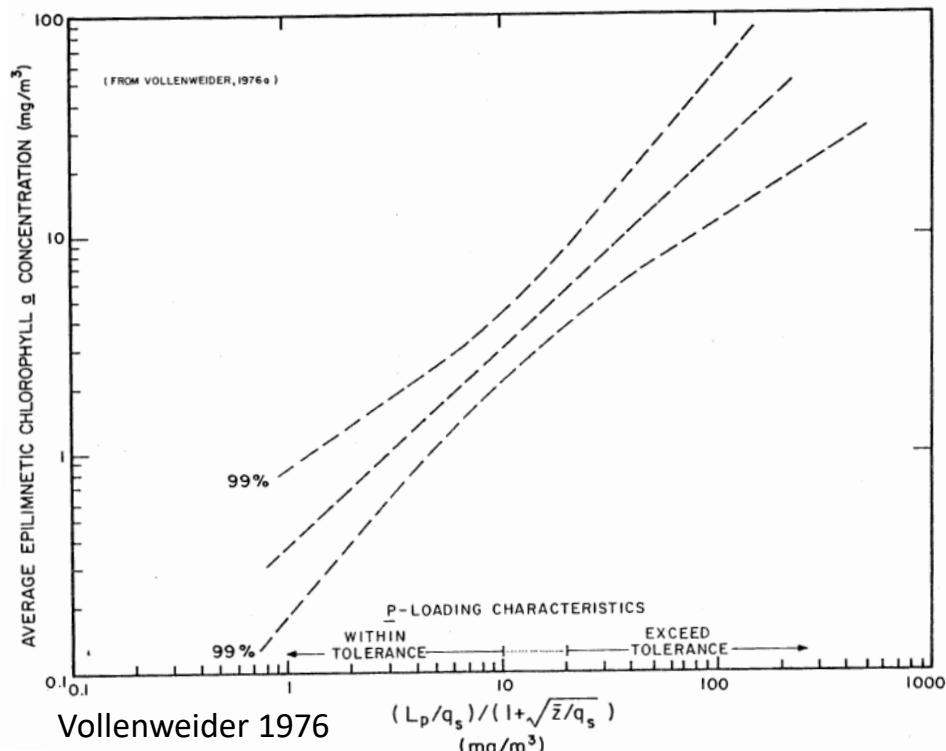
**Absent but amazing Co-Author: Cassandra Davis**

**NYSDEC; Division of Water, Monitoring and Assessment Section**

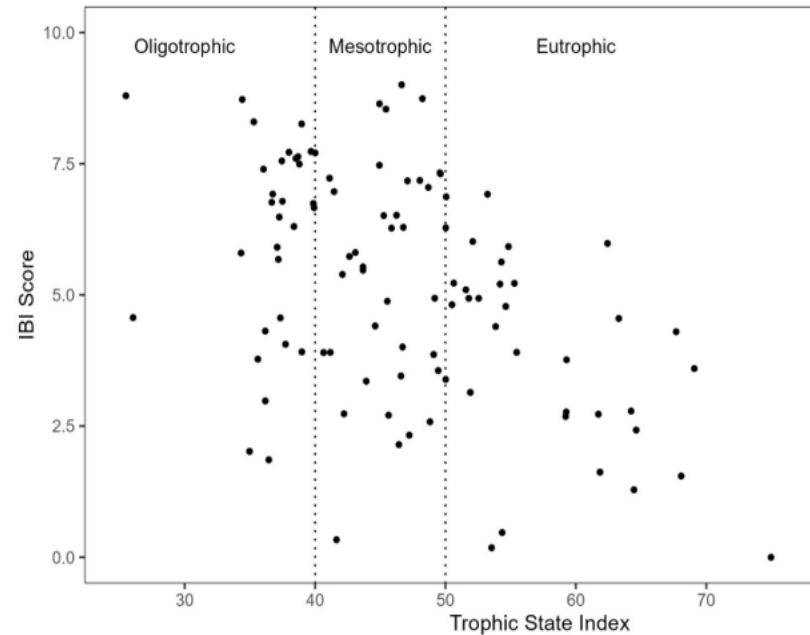
# Outline

- Background
- MN Protection Strategy
- Identifying a threshold of protection for NYS
- Other Considerations

# Total Phosphorus concentrations are a known factor influencing lake water quality

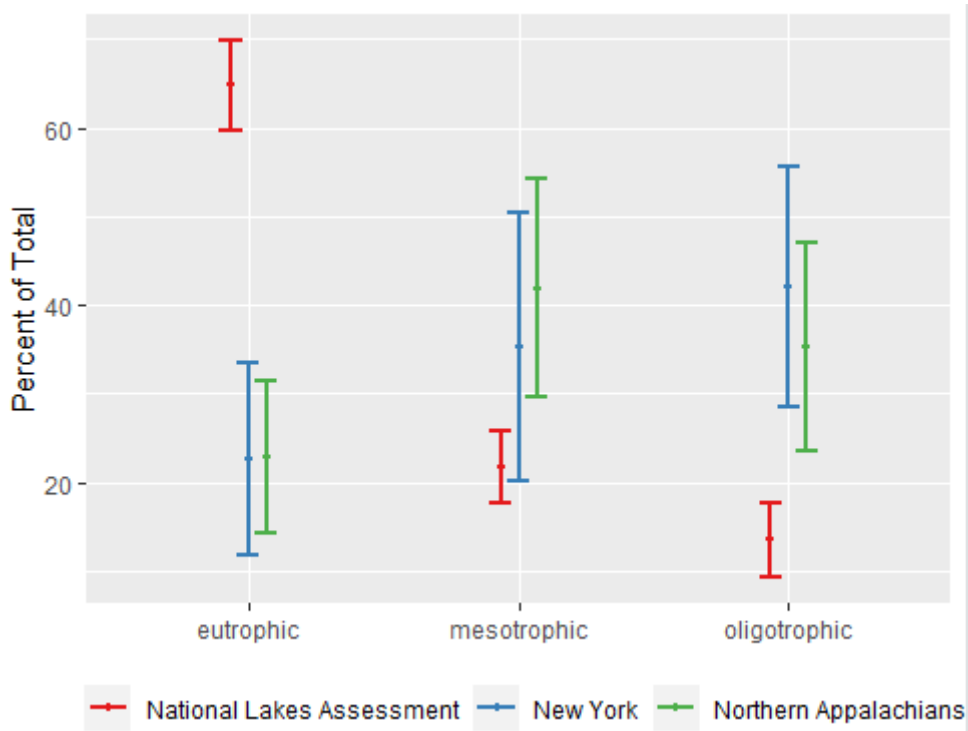


# Total Phosphorus hinders recreation,

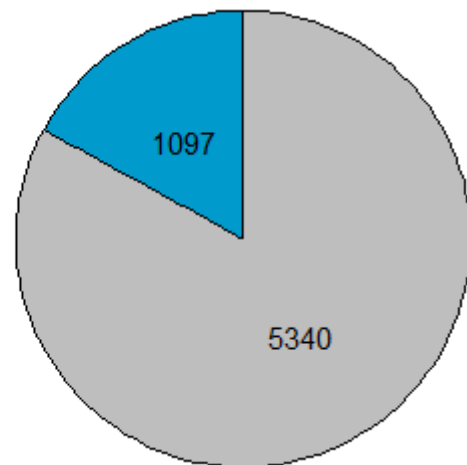
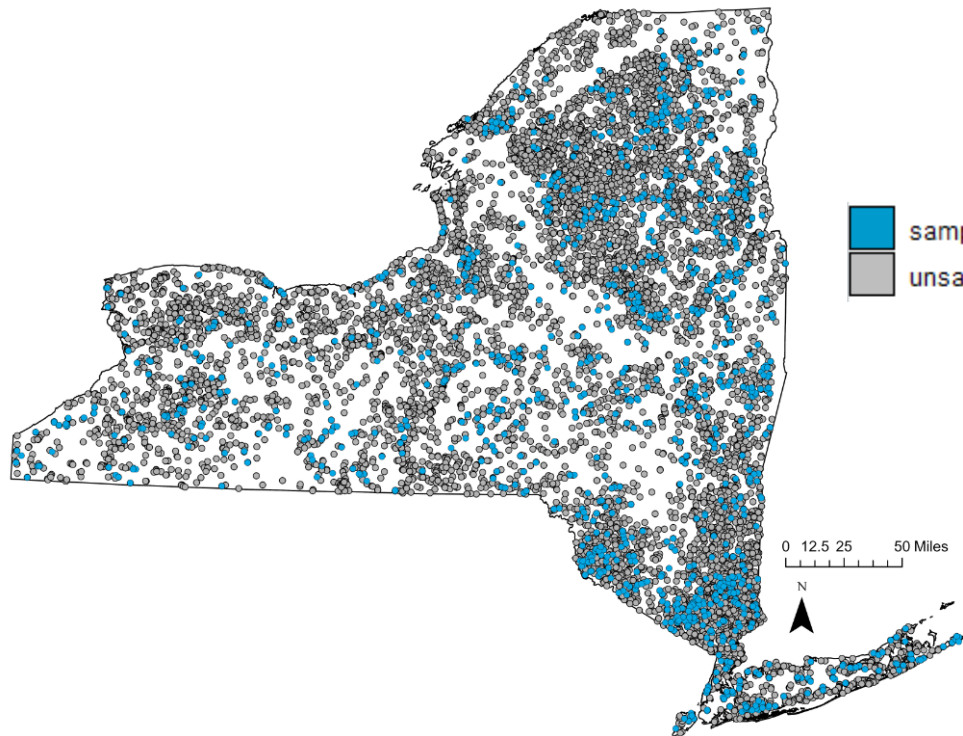


Kraft et al [manuscript in preparation]

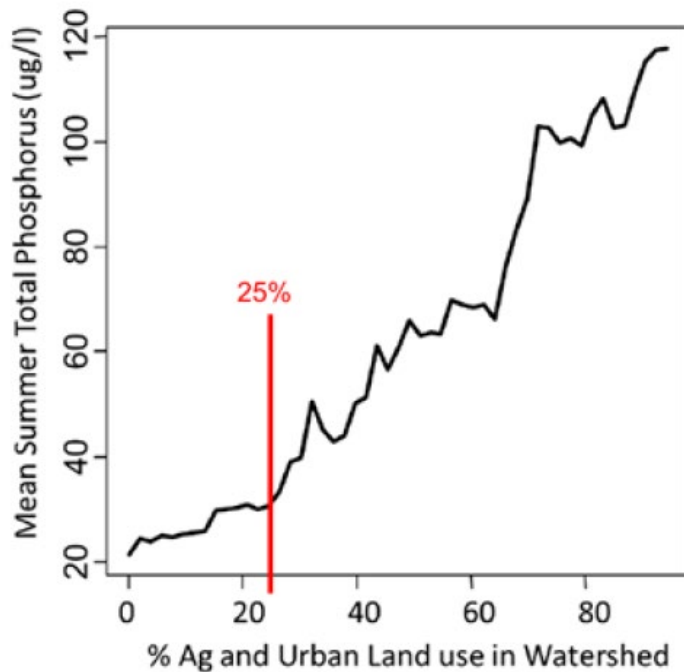
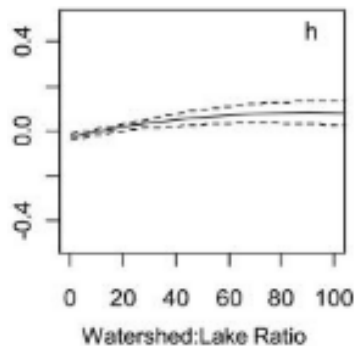
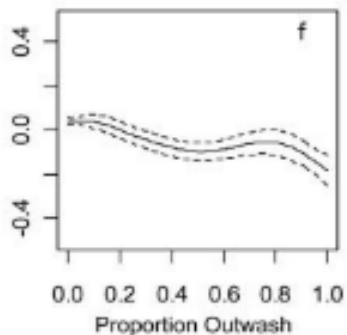
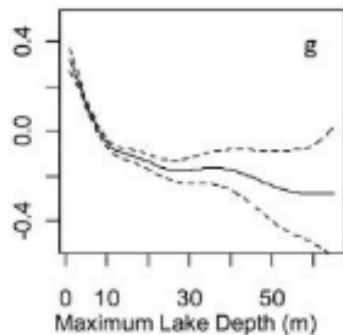
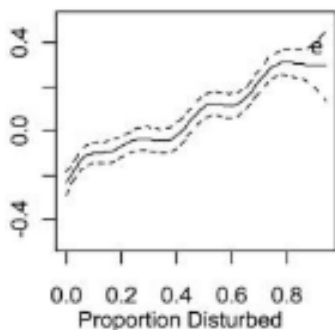
# Most NY Lakes are not eutrophic



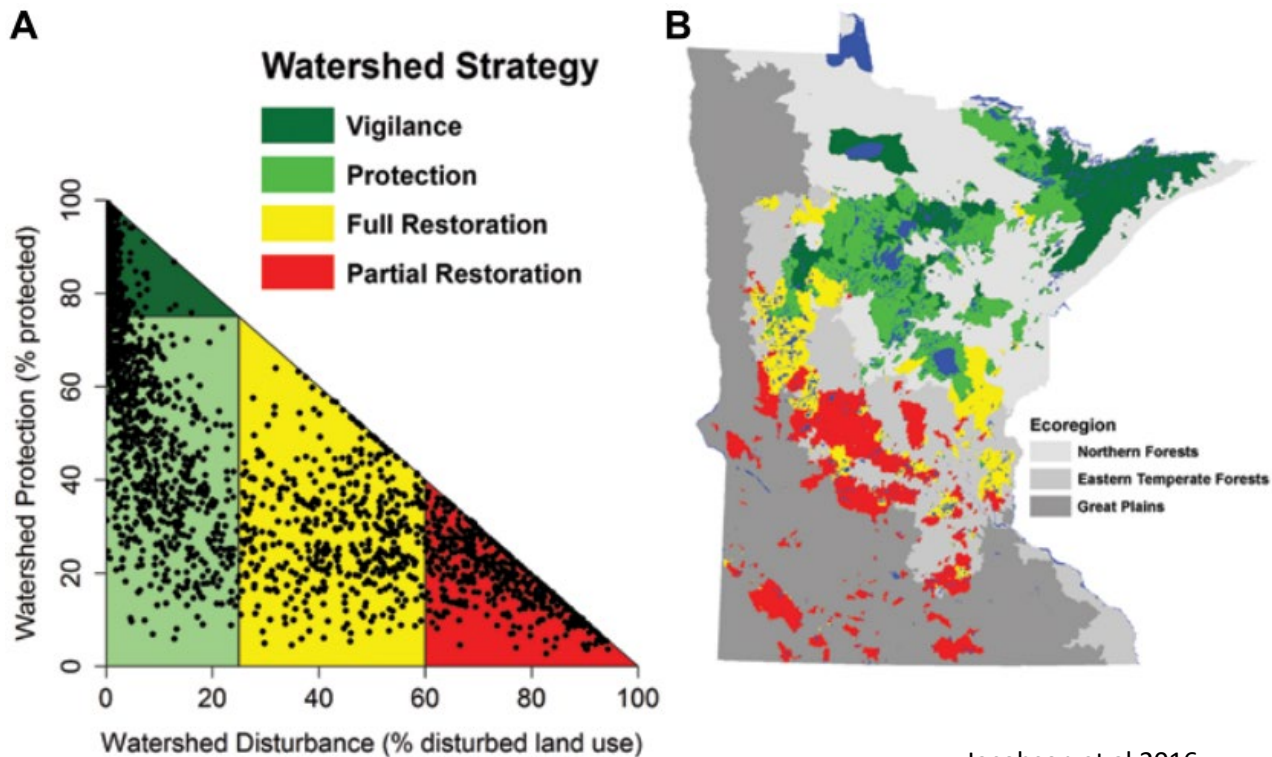
# Prioritizations are limited by sampling data



# MN's Surrogate Measure of Water Quality



# MN's Protection Prioritization Strategy



Jacobson et al 2016

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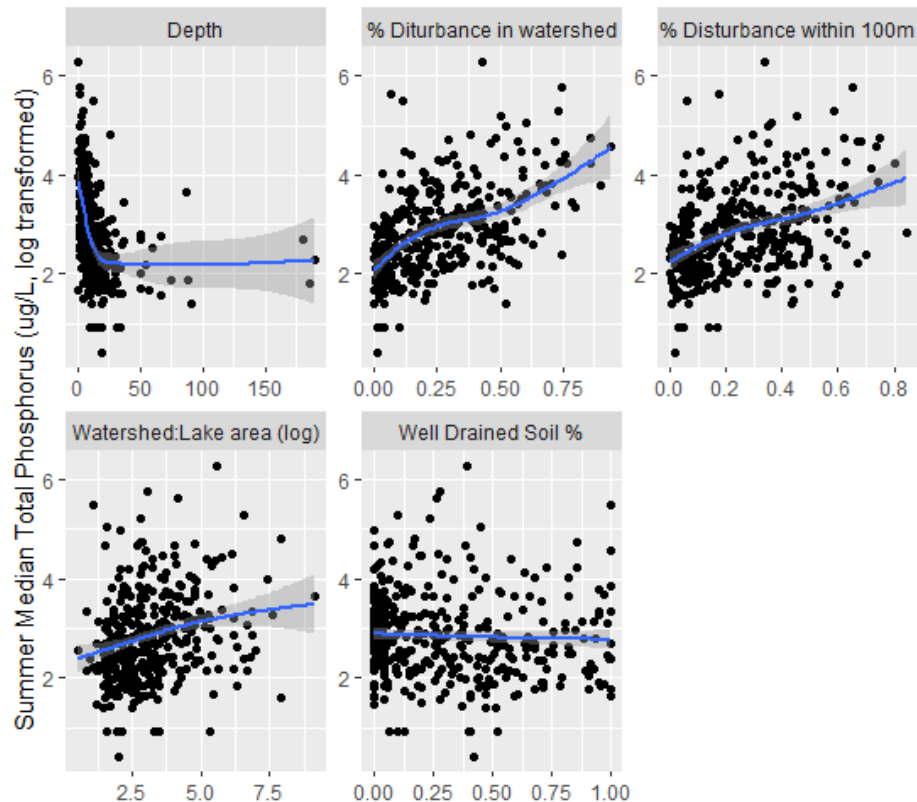
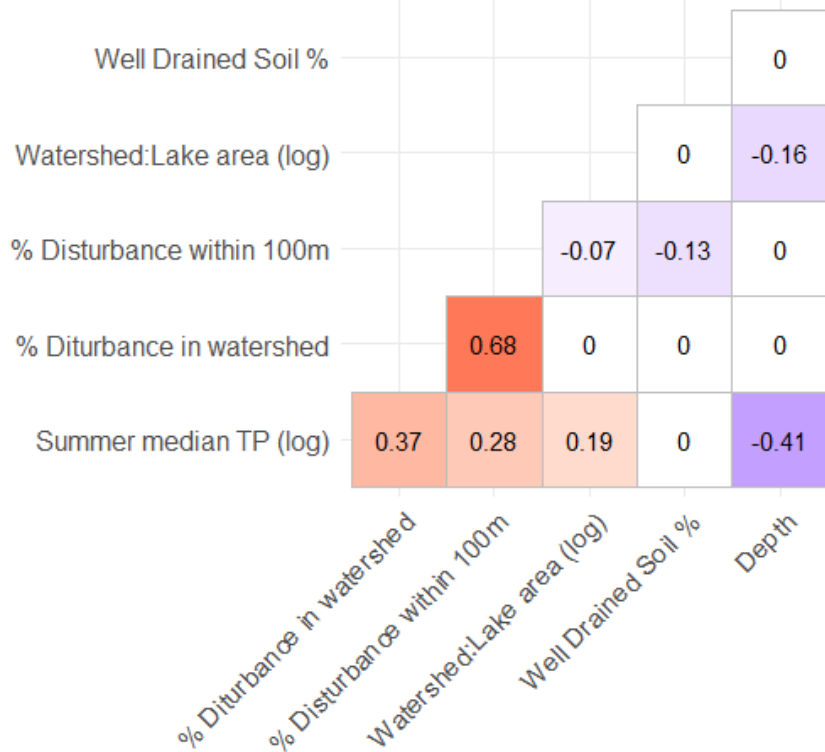
# NY's Surrogate Measures of Water Quality

Surrogate	Data Sources
Maximum lake depth	NYSDEC measurements
Watershed:Lake ratio (log transformed)	The Lake-Catchment (LakeCat) Dataset NLCD
% well drained soils	NRCS SSURGO Soils raster (types A+B)
% land disturbance in the watershed	% ag and urban land disturbance within the watershed according to the 2019 NLCD
% land disturbance within 100m	% ag and urban land disturbance within 100m of the NHD flowlines and waterbodies



# NY's Surrogate Measures of Water Quality

Kendall Tau Correlations



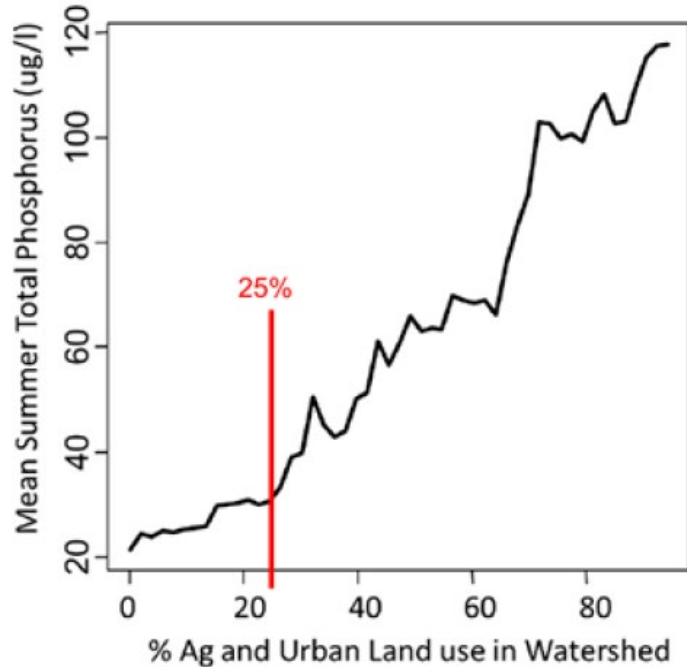
# NY's TP Predictive GAM Model

GAM	AIC	Rsq	Deviance Explained	p-value % disturbance	p-value depth	p-value W:L area
logTP ~ % land disturbance + Depth + W:L area(log)	708	0.56	0.58	0	0	0.0029
logTP ~ % land disturbance 100m + Depth + W:L area(log)	767	0.49	0.51	0	0	0.0002

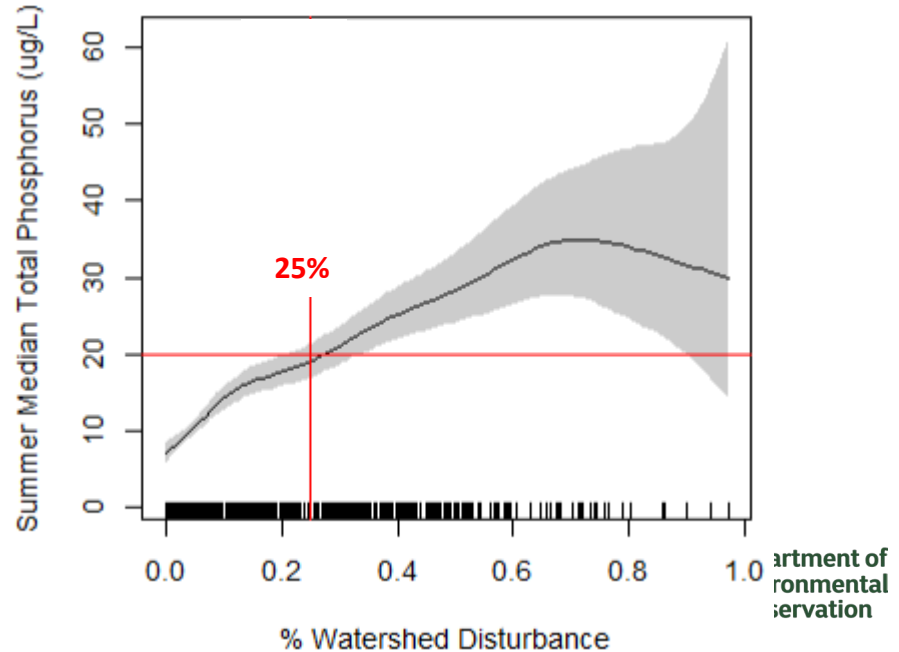


# Identifying a NY Threshold

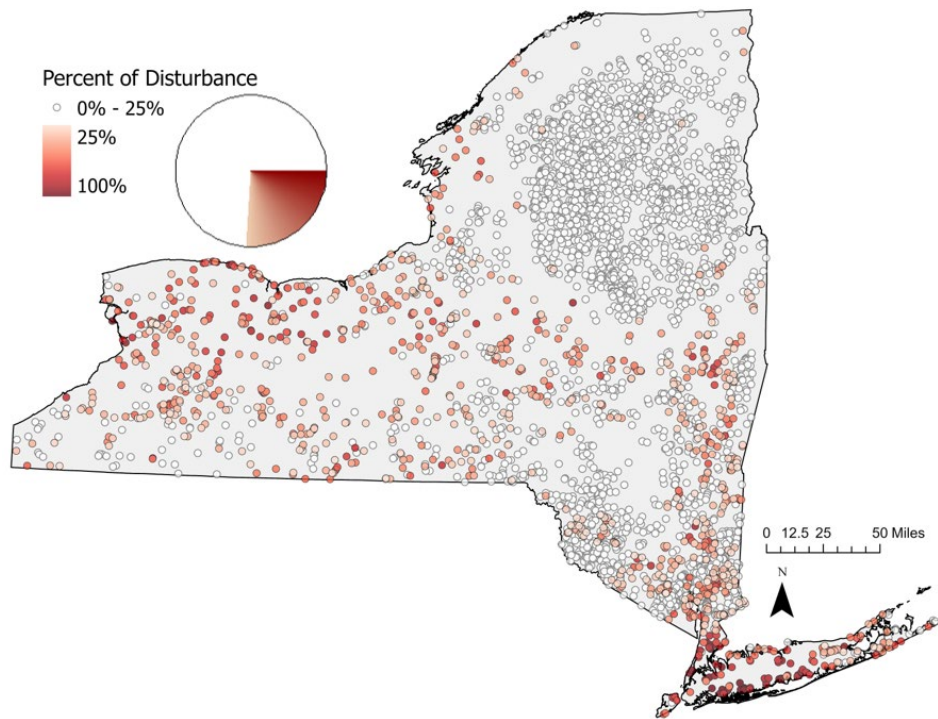
## MN's Threshold



## NY's Threshold



# Statewide Distribution of Lakes Below the NY Threshold

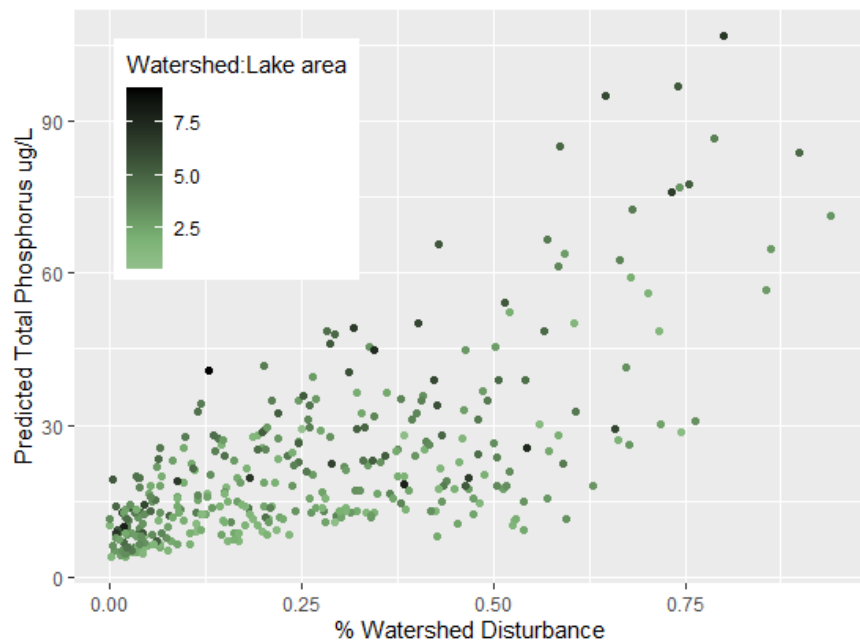
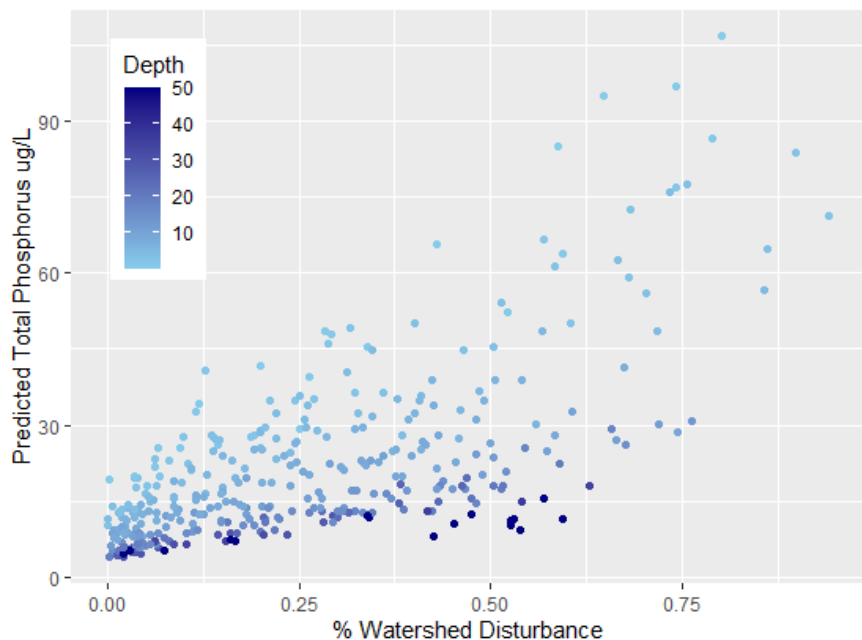


## WATERSHED CHARACTERISTICS

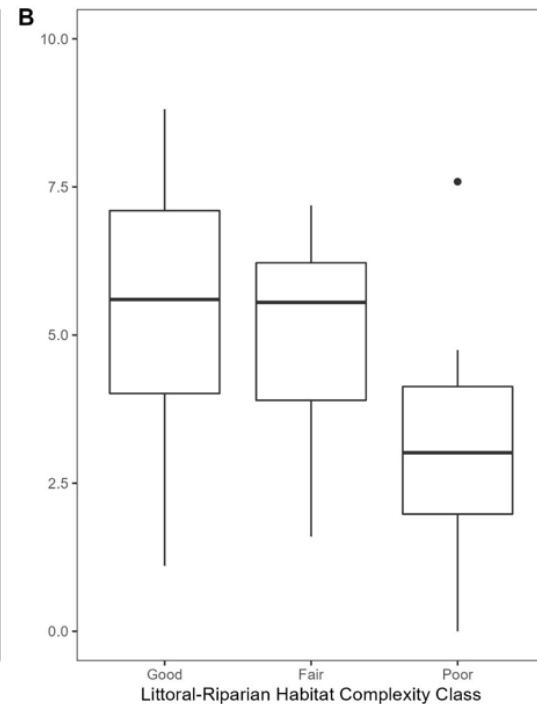
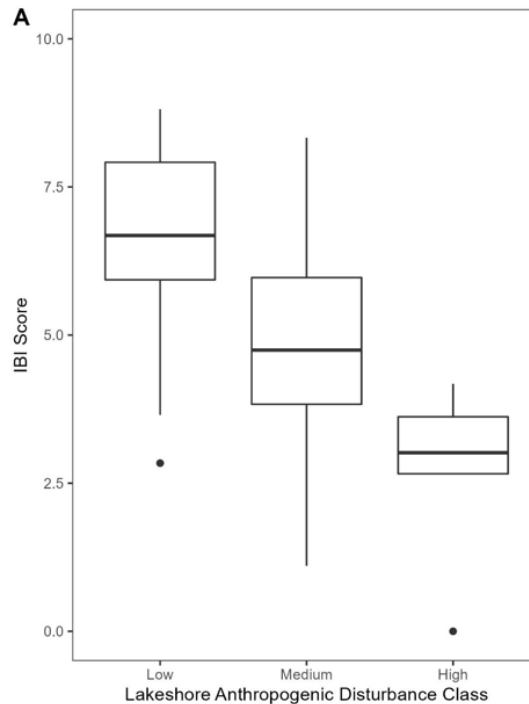
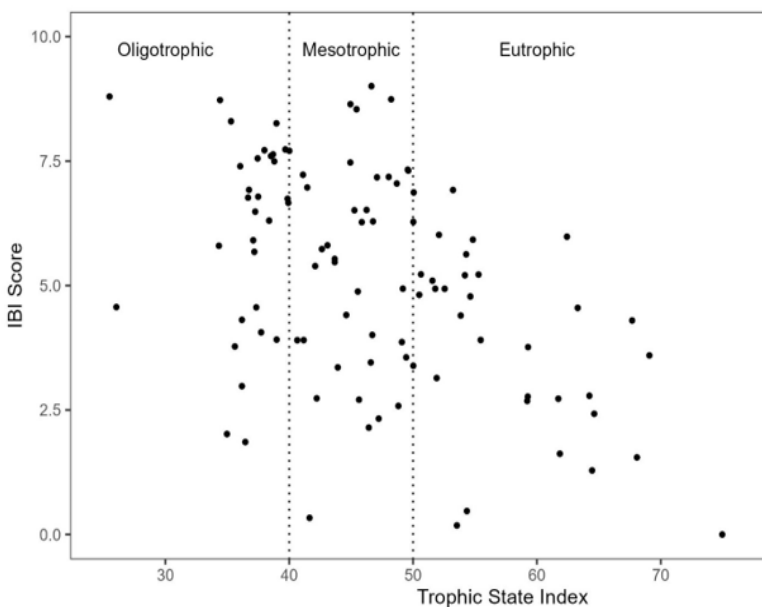
Watershed Area (AC)	2170
Watershed to Lake Ratio	17
Wetlands %	8
Barren Land %	0
Shrub Scrub %	0
Grassland Herbaceous %	0
Forest %	66
Developed %	24
Agriculture %	1



# The influence of depth and W:L area



# Other Considerations for Aquatic Life Protection



# Conclusions

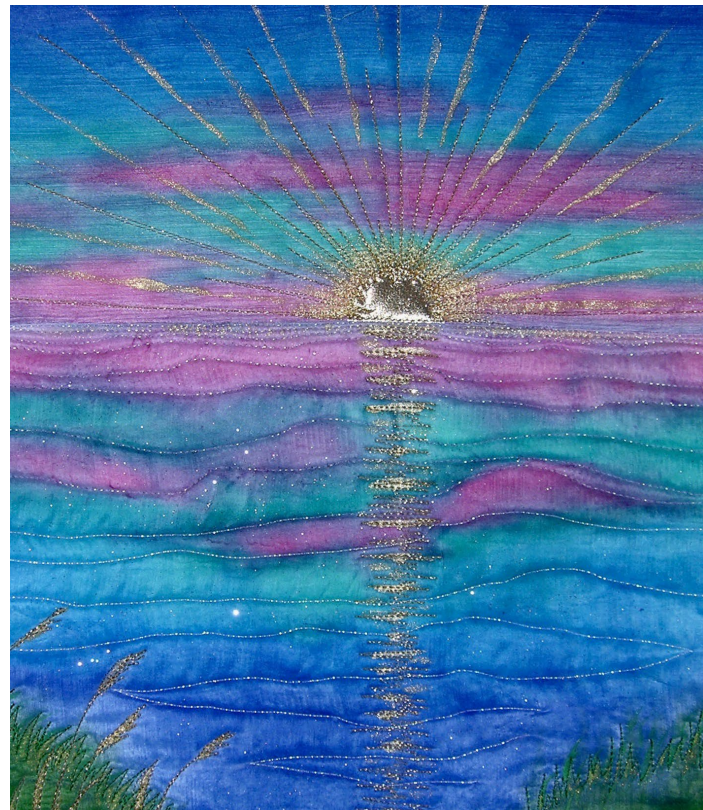
1. A generalized additive model using % land disturbance, lake depth, and watershed:lake area ratios serves as a valuable tool to predict phosphorus conditions in NYS
2. Using this model, we identified a critical benchmark of land disturbance at 25%, that once exceeded could result in exceedance of the NYS eutrophic threshold.
3. Protection priorities won't always be on the shoreline even though these are the most visible and obvious to those living and/or recreating on the lake.
4. % land disturbance will have less of an impact on deeper lakes and lakes with smaller watershed:lake areas
5. Fish and macroinvertebrates are impacted by shoreline habitat as well as trophic condition.





# Questions?

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