

# Nutrient Standards – Where will they lead?

OWEA / WEF Webinar  
February 24, 2011

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# Outline

- Current standards in Ohio
- Key principles and national guidance
- Future Ohio standards
- Likely effluent limits and timing

## Ohio's Current Approach (in place for ~10 years)

- Apply existing narrative criteria
- TMDL load reductions based on target nutrient values linked to narrative criteria via “*Associations*” report
- Permit limits for total phosphorus at POTWs (usually ~ 1.0 mg/l)
- NPS load reductions rely on voluntary partnership efforts (limited authority)

# Under Current Approach

- Currently 188 Ohio POTWs with phosphorus limits (~4100 total permits)
  - 76 Lake Erie basin
  - 74 based on TMDLs
- Currently an additional 353 POTWs monitor for phosphorus
  - Many will see limits based on TMDLs
    - Expect more limits below 1 mg/l

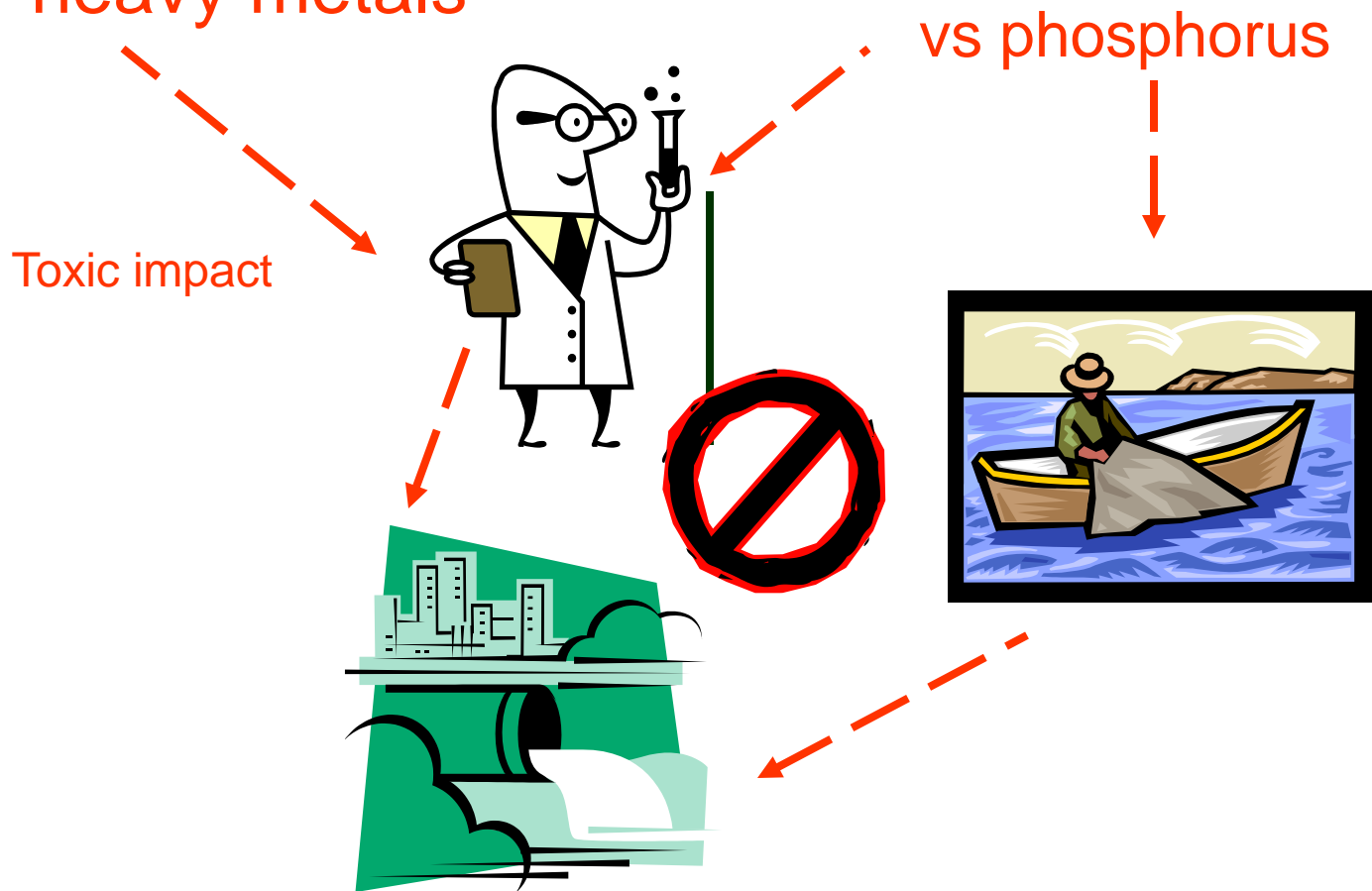
Most limits set at 1 mg/l  
a few ~ 0.5 mg/l



# Why have a new standard?

- Water quality problem exists
- Standard is designed to fix the problem
  - Set standard
  - Develop implementation strategies (controls) to meet the standard
- USEPA demands
  - Suits brought by citizen groups

# Controlling aquatic responses to heavy metals



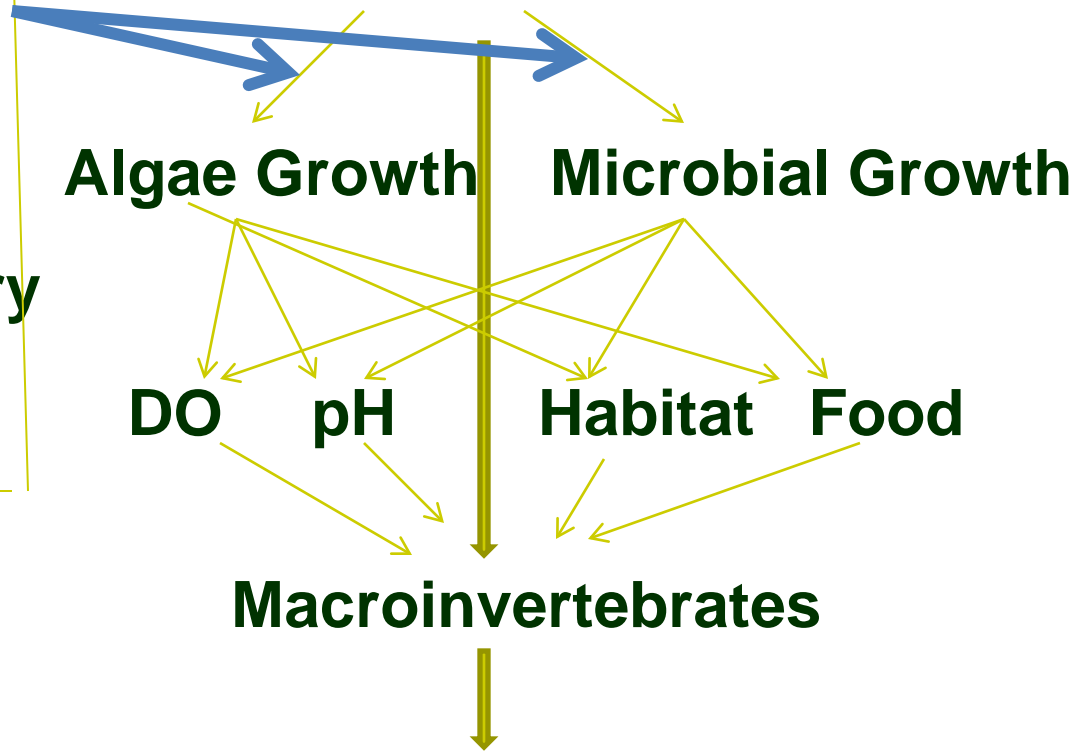
# ***Stressor-response approach*** \*

- *Estimate a relationship between nutrient concentrations and biological response*
- *Relate to designated use (ideally quantitatively)*
- *Derive nutrient concentrations protective of designated uses from the observed relationships*

\* Modified from “Empirical Approaches for Nutrient Criteria Derivation” draft SAB report, 2009

Light  
Flow  
Temperature  
Substrate  
Water Chemistry  
Herbivory  
Competition

## Nutrient Concentrations



**Over Enrichment = Impairment**

Adapted from *Empirical approaches for  
Nutrient Criteria Derivation* SAB Review Draft

# Federal Mandate for Nutrient Criteria

- States required to adopt numeric criteria
  - Growing discontent over lack of progress
- USEPA offered national guidance
  - Regional reference condition approach
  - Recent endorsement of empirically derived field based “stressor/response” criteria

# Development of Ohio's New Rules

- Completed stressor/response field studies
- Peer reviewed publication
  - Miltner, Robert J. 2010. A Method and Rationale for Deriving Nutrient Criteria for Small Rivers and Streams in Ohio. Environmental Management. Vol. 45 pgs 842-855.
- Working on implementation issues
  - At odds with USEPA over best way to account for uncertainty and “reasonable potential”



# Stream Nutrient Rule Package – Most Recent Draft

- 3745-1-44; WQS to control enrichment
- 3745-2-13; WLAs for nutrients
- 3745-33-07; RP for nutrients



# Trophic Index Criterion (TIC)

- Multi-metric score aggregated from separate evaluations of primary productivity, biological health and nutrient concentrations in stream
- TIC will determine the applicability of water quality criteria for total phosphorus (TP) and dissolved inorganic nitrogen (DIN) to streams and rivers up to 1000 sq. miles

# Multi-metric Assessment

■  $TIC = P_{chl\ a} + P_{DO} + B + N$

□ Where:

- TIC = trophic index criterion.
- $P_{chl\ a}$  = primary productivity as measured by chlorophyll a concentrations.
- $P_{DO}$  = the impact of primary productivity as measured by dissolved oxygen concentrations and ranges.
- B = the response of stream biology as measured by biological survey results.
- N = the degree of enrichment as measured by TP and DIN concentrations.

# Desired Data Set

- P = Primary productivity
  - Benthic algal biomass chlorophyll a \*
  - Minimum and 24 hour dissolved oxygen
- B = Fish and bug survey results
- N = instream concentrations (TP and DIN)

\* New data need



# Current and Projected Responses

- Routine survey program provides data on the response of stream to current nutrient loads
- Models can project likely future stream conditions if nutrient loads could increase

# No Data?

- **A default score assigned by rule:**
  - In situations lacking any representative the metric score is 1
- Provides incentive to collect desired data
- Allows permitting to proceed if data is absent

# Chlorophyll a metric scoring for TIC calculation

Representative Chlorophyll a Concentration (mg/m <sup>2</sup> )	Metric Score ( $P_{chl\ a}$ )
Less than 120	4
120 to 182	2
183 to 320	1
Greater than 320	0

Similar scoring for  $P_{DO}$ , B & N

# TIC Criterion (the measurement of enrichment)

Status of Stream	TIC
Acceptable – nutrient enrichment is not likely.	8 to 19
Threatened – nutrient enrichment is likely now or in the future.	4 to 7
Impaired – nutrient enrichment is documented.	0 to 3

Caution – these values and the scoring of each metric still subject to change based upon more testing with existing data sets

# TP & DIN Criteria

These criteria apply if TIC status is threatened or impaired

Aquatic Life Use and QHEI	TP (ug/l)	DIN (ug/l)
Exceptional warmwater habitat	60	3,000
Warmwater habitat and QHEI score = 12 to 64	160	3,000
<u>All other aquatic life uses and QHEI scores</u>	300	3,000

Lower biological expectations for MWH, LRW

Streams with intact habitat features assimilate nutrients

# Uses for Criteria

- TIC drives the 303(d) listing process
  - TMDLs for threatened or impaired waters
  
- TIC determines reasonable potential (new 3745-33-07)
  - Apply TP criteria when TIC status is threatened or impaired;
  - Apply DIN criteria when TIC status is threatened or impaired and we determine stream is nitrogen limited (via N:P ratios <7:1)
  
- TP & DIN criteria used to develop TMDLs & WLAs
  - New rule 3745-2-13
  - Many final effluent TP limits in the range of 0.1 mg/l to 0.5 mg/l

# Reasonable Potential (RP)


- Biological survey data will not always be available or representative of future conditions
- Protocol must be able to gauge if there is a reasonable potential for harm to aquatic system when:
  - There are no data on response variables
  - Response variable data is inconclusive
  - Nutrient loadings are expected to increase (model results)
- Defining RP protocol is focus of current work

# Water Quality Trading Option

- Option allows up to 3 NPDES permit cycles for existing POTWs to meet final nutrient limits
  - Initial and 2<sup>nd</sup> permit set  $\leq$  1 mg/l TP, 10 mg/l DIN
  - Keep the interim permit limit as final limit if stream recovers (TIC returns to acceptable range)
- Similar in concept to a recently adopted nutrient rule package in Wisconsin

# Take Home Points, Draft Rules

- Key off of “response indicators”
- Provide flexibility
- Address road blocks with USEPA:
  - Make the “weight of evidence” vs. “independent application” of criteria less of a point of conflict
  - Demonstrate that the TIC can assess current loads **and** potential increases



# Future Milestones (tentative)

- November 2010 – share draft rules with Region V
- Spring 2011 – Release draft rules for IPR
- Fall 2011 – File proposed rules
- Spring 2012 – Adopt rules
- Summer 2012 – Rules effective

# When to expect limits --

- Check the TMDL basin schedule
  - [www.epa.ohio.gov/dsw/tmdl/index.aspx](http://www.epa.ohio.gov/dsw/tmdl/index.aspx)
- If POTW is expanded, then Best Available Demonstrated Control Technology (BADCT) for new sources apply:
  - Apply more stringent of TMDL or BADCT
  - Proposed amendment to WQS antidegradation rule, monthly average BADCT limits:
    - Total Phosphorus = 2 mg/l
    - Total Nitrogen = 10 mg/l
  - [www.epa.ohio.gov/dsw/rules/draft\\_antidegradation\\_oct08.aspx](http://www.epa.ohio.gov/dsw/rules/draft_antidegradation_oct08.aspx)

# Questions?



## ■ Contact information

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