Highlights of State Approaches to Interpreting the Narrative for Nutrients

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Background

- MDEQ asked EPA for information on state activities to interpret the narrative for nutrients
- Reviewed information on EPA's website regarding which states had adopted numeric nutrient criteria for rivers/streams
  - Source: https://www.epa.gov/nutrient-policy-data/state-progress-toward-developing-numeric-nutrient-water-quality-criteria
- Focused on state efforts to interpret the narrative or derive N and P criteria for streams/rivers, not lakes/reservoirs

States with N or P numeric nutrient criteria for rivers and streams adopted into standards

States that have adopted TP criteria that apply statewide include:	MN, NJ, WI
	Criteria range from 0.75 to 0.100 mg/L
States that have adopted site-specific TP criteria	OK, VT
	Criteria values range from 0.009 to 0.037 mg/L

States with TN and TP numeric nutrient criteria for rivers and streams adopted into standards

- States that have adopted TN and TP criteria that apply statewide include:
  - American Samoa, Guam, HI, Northern Mariana Islands, Puerto Rico
  - In Hawaii, criteria range from 0.050-0.150 mg/L TP and 0.180-0.600 mg/L TN
- States that have adopted site-specific TN and TP criteria
  - AZ, CA, FL, MT, NV
  - Criteria range from 0.06 to 0.75 mg/L TP and 0.250 to 2.5 mg/L TN

Approaches to Interpreting the Narrative for 303(d) listing purposes

Commonly used state approaches to interpreting the narrative for nutrients may be grouped into the following “categories”:

- Use existing numeric criteria (e.g., DO, pH) to identify possible nutrient impacts
- Rely on biological endpoints (e.g., diatoms, benthic algae, macroinvertebrates)
- Consider multiple lines of evidence
- Identify numeric thresholds for nutrients (e.g., reference-based; thresholds associated with impairment)

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  Example: California

California

- https://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf
- 3.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water Numeric water quality objectives for conventional pollutants are exceeded as follows:
  - For depressed dissolved oxygen, if measurements of dissolved oxygen taken over the day (diel) show low concentrations in the morning and sufficient concentrations in the afternoon, then it shall be assumed that nutrients are responsible for the observed dissolved oxygen concentrations if riparian cover, substrate composition or other pertinent factors can be ruled out as controlling dissolved oxygen fluctuations.

California

- 3.7.1 Nutrient-related
  - An acceptable nutrient-related evaluation guideline is exceeded using the binomial distribution as described in section 3.1 for excessive algae growth, unnatural foam, odor, and taste. Waters may also be placed on the section 303(d) list **when a significant nuisance condition exists as compared to reference conditions, or when nutrient concentrations cause or contribute to excessive algae growth**. If listing for nitrogen or phosphorus specifically, RWQCBs should consider whether the ratio of these two nutrients indicates which is the limiting agent.

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- Example: Connecticut

Connecticut

- https://portal.ct.gov/-/media/DEEP/water/water_quality_management/305b/2020-RJ/2020_IWQR_draft_04242020_final.pdf
- “When there is an impairment to aquatic life in wadeable streams, CT DEEP has a weight of evidence approach to determine whether TP is the cause of this impairment. This procedure includes using a combination of three measures: **stream aquatic life biological assessments (MMI, BCG), TP concentrations, and diatom TP tolerance metrics**.
- Detail to the method is summarized in a technical support document (Becker and Bellucci 2019). The approach draws on previous research conducted on phosphorus in CT (Becker 2012, Smucker et al 2013, Becker et al 2018)”

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- Consider multiple lines of evidence

- Example: Maine, Minnesota, New Mexico

Maine

- https://www.maine.gov/dep/water/nutrient-criteria/index.html
- Developed in 2012. Response variables are already adopted as criteria and are used for assessments.
- State isn't currently using the assessment approach in its entirety b/c it was not adopted as a combined criterion yet.

Maine Draft Combined Criterion

Nutrient criteria		Statutory Class						
		AA/A	B	C	A Impounded	B Impounded	C Impounded	GPA
		≤18.0 µg/L (ppb) TP[a] and all of the response indicator[b] values in this column OR all of the response indicator[b] values in this column	≤30.0 µg/L (ppb) TP[a] and all of the response indicator[b] values in this column OR all of the response indicator[b] values in this column	≤33.0 µg/L (ppb) TP[a] and all of the response indicator[b] values in this column OR all of the response indicator[b] values in this column	≤18.0 µg/L (ppb) TP[a] and all of the response indicator[b] values in this column OR all of the response indicator[b] values in this column	≤30.0 µg/L (ppb) TP[a] and all of the response indicator[b] values in this column OR all of the response indicator[b] values in this column	≤33.0 µg/L (ppb) TP[a] and all of the response indicator[b] values in this column OR all of the response indicator[b] values in this column	≤15.0 µ (ppb) T and all of t respo indica value this col OR all of respo indica value this col
	Percent Algal Cover[c]	≤ 20.0	≤ 25.0	≤ 35.0	--	--	--	--
	Water Column Chl *a* (µg/L, ppb)	≤ 3.5 (≤ 5.0[d])	≤ 8.0	≤ 8.0	≤ 5.0	spatial mean ≤ 8.0 and no value > 10.0	spatial mean ≤ 8.0 and no value > 10.0	≤ 8.(
	Secchi Disk Depth (m)	≥ 2.0						
	Patches of Bacteria and Fungi	None observed						
	pH	6.0-8.5						
	Dissolved Oxygen (mg/L, ppm)	As per 38 M.R.S.A. § 465						--
	Aquatic Life	As per 38 M.R.S.A. §§ 464 and 465 and where applicable *Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams,* 06-096 CMR 579 (Effective May 27, 2003)						As per M.R.S § 465-

Maine Decision Framework

	Mean total phosphorus concentration is less than or equal to the applicable value in Table 1 or an established site-specific value.	Mean total phosphorus concentration is greater than the applicable value in Table 1 or an established site-specific value.
All measured response indicators meet the values in Table 1	A. **Not Impaired.** Nutrient criteria attained	B. **Not Impaired.** Department may conduct a study to develop a site-specific total phosphorus value as described in Section I.5.B of this Chapter.
One or more of the measured response indicators do not meet the values in Table 1	C. **Impaired.** Department conducts weight-of-evidence analysis to determine cause of impairment as described in Section I.5.C of this Chapter.	D. **Impaired.** Nutrient criteria not attained.

Minnesota

Minnesota Pollution Control Agency

Table 5. Minnesota's River Eutrophication and site-specific standards for navigational pools, Lake Pepin and specifically named river reaches.

Region or River	Causative	Response (stress)		
	Total Phosphorus (ug/L)	Chlorophyll-*a* (ug/L)	Diel Dissolved Oxygen Flux (mg/L)	Biological Oxygen Demand (mg/L)
Northern River Nutrient Region	50	7	3.0	1.5
Central River Nutrient Region	100	18	3.5	2.0
Southern River Nutrient Region	150	40	5.0	3.5
Site-Specific Standards				
Mississippi River Navigational Pool 1	100	35		
Mississippi River Navigational Pool 2	125	35		
Mississippi River Navigational Pool 3	100	35		
Lake Pepin (Mississippi River Navigational Pool 4)	100	28		
Mississippi River Navigational Pools 5 to 8	100	35		
Crow Wing River from Long Prairie River to the Mouth of the Crow Wing River	75	13	3.5	1.7
Crow River from the confluence of the North Fork and South Fork of the Crow River to the mouth of the Crow River	125	27	4.0	2.5

New Mexico

Table 3. TN and TP causal thresholds by site class

Parameter and Site Class	Site Median Threshold (90th quantile) (mg/L)	Site Median Upper Assessment Threshold (90% confidence interval of 90th quantile) (mg/L)
TN Flat	0.69	0.85
TN Moderate	0.42	0.51
TN Steep	0.30	0.34
TP High-Volcanic	0.105	0.114
TP Flat-Moderate	0.061	0.069
TP Steep	0.030	0.053

Table 4. DO response thresholds by site class

Site Class	Daily Delta DO* Threshold (mg/L)
TP High-Volcanic	5.02
TP Flat-Moderate	4.08
TP Steep	1.79

NM Decision Framework

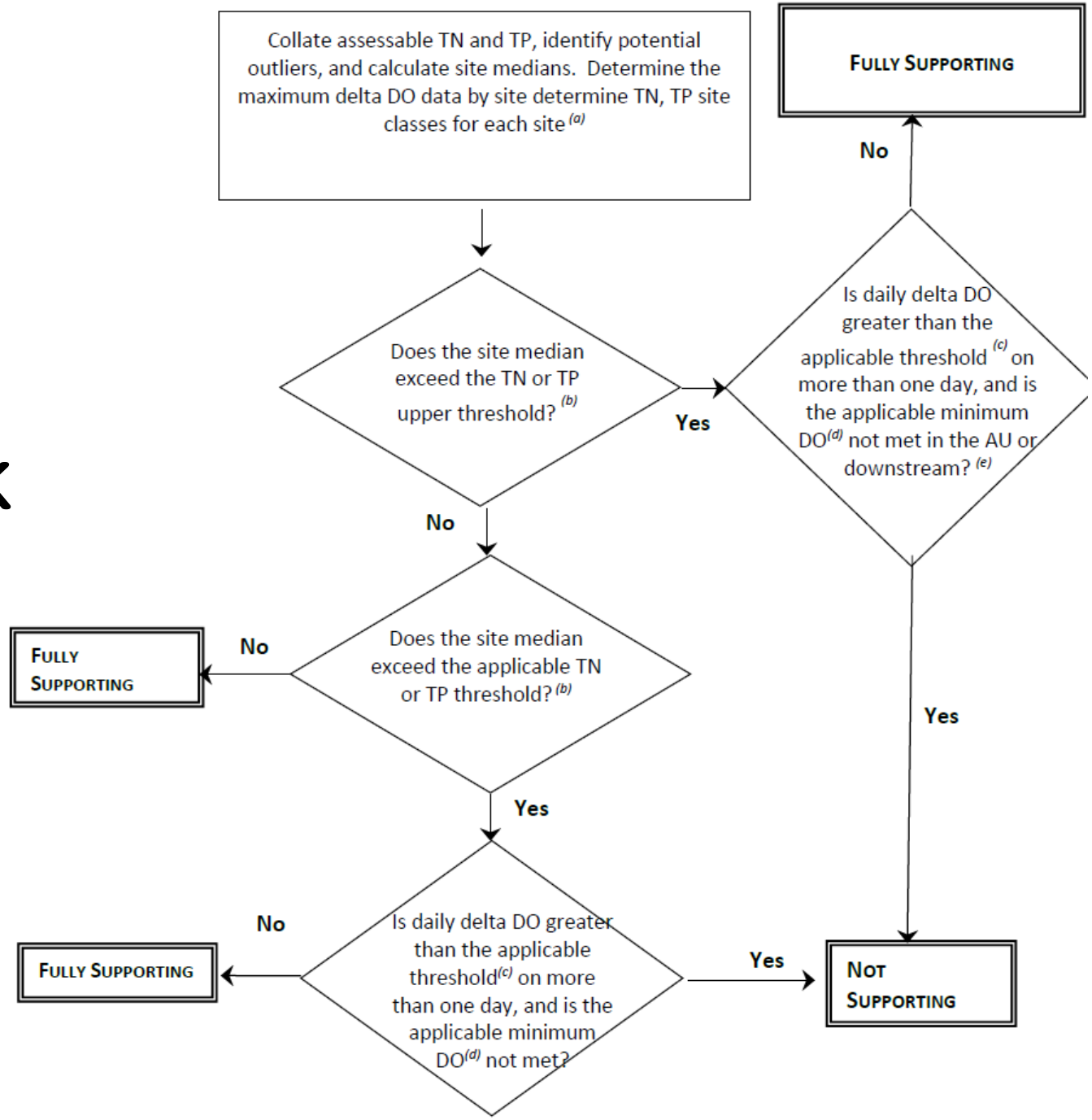

Figure 4. Generalized flowchart for determining nutrient impairment

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Kansas

Kansas Department of Health and Environment

- https://www.kdheks.gov/tmdl/2020/2020_303_d_Methodology.pdf
- "While KDHE has not adopted any specific nutrient criteria for phosphorus, some value for interpreting the narrative criteria is needed. There are 3 other ecoregions covering Kansas, and the 67 µg/L value is larger than the TP values corresponding to two of the three ecoregions. Nonetheless, the **67 µg/L value is viewed as a reasonable indicator of acceptable total phosphorus levels in Kansas streams.**
- Specifically, for the purpose of developing the 2018 303(d) list, we shall consider a water as impaired by total phosphorus when a dataset of at least 12 samples over 2000 – September 30, 2019 **for a monitoring site has a median concentration of total phosphorus exceeding 201 µg/L, or three times the 2001 guidance value.** This interpretive value should not be seen as a final determination of nutrient concentrations acceptable to the state of Kansas, but rather as a first step in addressing the most seriously impaired waters while the state continues to deliberate specific nutrient criteria to be adopted in the future."

•Tennessee

- https://www.tn.gov/content/dam/tn/environment/water/documents/nutrient_final.pdf
- Established the TN and TP concentrations observed at the 90th percentile of reference sites as numeric thresholds to list waters as impaired for nutrients

Other Resources

- State Water Programs: Nutrient Reduction Programs and Methods December 2012 Association of Clean Water Administrators. https://www.acwa-us.org/wp-content/uploads/2017/04/acwa-nutrient-reduction-report_dec142012-1.pdf

- EPA information available on the type and number of NPDES permitted facilities by state https://www.epa.gov/npdes/status-nutrient-requirements-npdes-permitted-facilities.

- Nutrient Reduction Progress Tracker: Version 1.0 – 2017. Report March 2018. Association of Clean Water Administrators. https://www.acwa-us.org/wp-content/uploads/2018/03/Nutrient-Reduction-Progress-Tracker-Version-1.0-2017-Report.pdf.

- Additional nutrient information is summarized in the 2018 National Training Workshop for CWA 303(d) Listing and TMDL staff: Success in the second half of vision implementation. Final Project Report and Training workshop Proceedings.

- Soon to be released: Compendium of state nutrient permitting practices

DRAFT Compendium of State and Regional NPDES Nutrient Permitting Approaches