

### **New Mexico Environment Department**

**TRANSLATING A NARRATIVE NUTRIENT CRITERION INTO WQBELS** 

Shelly Lemon, Surface Water Quality Bureau Chief, NMED ACWA Nutrients Permitting Workshop November 5, 2019





New Mexico is the

- 5<sup>th</sup> largest state by area, but only the
- 36<sup>th</sup> most populous of the 50 States.

New Mexico's landscapes include mountains, basins, mesas, plains, and deserts.



Highest point is 13,167 ft Lowest point is 2,844 ft Mean elevation is 5,700 ft Average precipitation is 13.9 in/yr





"Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in a dominance of nuisance species in surface waters of the state."



The question is, how to assess for attainment of this standard and define *quantifiable endpoints* AND THEN implement these endpoints to achieve meaningful nutrient reductions in surface waters and attain the standard.



- In 2004 developed a weight of evidence nutrient assessment protocol for wadeable, perennial streams using threshold values for both cause (TP & TN) and response (Chlorophyll and DO) variables.
- The thresholds used by SWQB were the 50<sup>th</sup> quantiles of all sites grouped by ecoregion and aquatic life use with no link to use impairment or definition of "natural" conditions.
- The TN and TP thresholds were frequently exceeded at sites with little human activities in the watershed and therefore did not provide an effective filter for identifying Impairment.



To address these issues, in 2013-2015 NMED in cooperation with EPA and a contractor conducted a project to refine NM's nutrient thresholds using stressor response analyses and defined reference conditions and site classes.

The Project included the following steps:

- Compile Data
- Identify Reference Sites
- Classify Sites
- Analyze Nutrient Value Distributions
- Conduct Stressor-Response Analysis
- Synthesize Resulting Thresholds





Site Median	TN (mg/L)			TP (mg/L)		
	Flat	Moderate	Steep	Volcanic	Flat-Moderate	Steep
Thresholds	0.69	0.42	0.30	0.105	0.061	0.030

- TN and TP causal thresholds (i.e., "numeric translators") represent nutrient conditions above which, "...produce undesirable aquatic life or result in a dominance of nuisance species..."
- Protective of stream and scientifically defensible.
- But not technologically achievable end-of-pipe.



## **Important Details**

- New Mexico does not have delegated authority for NPDES program
- EPA Region 6 is responsible for NPDES program in NM
- There was no regulatory mechanism to require EPA to incorporate alternatives in permits
- Implementation section of TMDL is not approved by EPA



"All calculations based on experience elsewhere, fail in New Mexico." NM Territorial Governor Lew Wallace



General consensus that... TMDLs should be written to nutrient targets that are protective of the stream and scientifically defensible.

	TN (mg/L)			TP (mg/L)			
	TN	TN	TN	TP High-	TP Flat-	ТР	
	Flat	Moderate	Steep	Volcanic	Moderate	Steep	
Threshold	0.69	0.42	0.30	0.105	0.061	0.030	

However, differing ideas on... how TMDLs should be implemented through NPDES permitting.



# NM's First Iteration of Nutrient TMDL Implementation

- NM writes Nutrient TMDLs that address causal variables (phosphorus and nitrogen)
- Nutrient thresholds are used as TMDL targets and for calculating protective WLAs (WQBELs) for NPDES permits

### Rio Ruidoso TMDL (2005)

■ WLA based on TN = 1 mg/L; TP = 0.1 mg/L\*

\* Segment-specific numeric TP criterion in WQS; TN translator was established using a 10:1 ratio of nitrogen to phosphorus.



#### NM0029165 – Ruidoso/Ruidoso Downs WWTP; effective Aug 2012 – July 2017

Pollutant	30-D Avg LOAD	Daily Max LOAD	30-D Avg CONC	Daily Max CONC	Frequency
Nitrogen, Total (Temp < 13°C)	135.2 lb/d	Report	6.0 mg/L	6.0 mg/L	Once/ 2 weeks
Nitrogen, Total (Temp ≥ 13°C)	90.1 lb/d	Report	4.0 mg/L	4.0 mg/L	Once/ 2 weeks
Nitrogen, Total*	18.9 lb/d	Report	1.0 mg/L	1.5 mg/L	Once/ month
Phosphorus, Total	2.16 lb/d	Report	0.1 mg/L	0.15 mg/L	Once/ month

4-year compliance schedule to meet temperature-dependent TN effluent limits.\*Attain final effluent limitations for Total Nitrogen on last day of permit term.



## Ruidoso TMDL Updated in 2016 – Subsequent Permit Requirements

#### NM0029165 – Ruidoso/Ruidoso Downs WWTP; effective Sep 2017 – Aug 2022

Pollutant	30-D Avg LOAD	Daily Max LOAD	30-D Avg CONC	Daily Max CONC	Frequency
Nitrogen, Total*	37.8 lb/d	N/A	Report	Report	3/month
Phosphorus, Total	1.67 lb/d	N/A	Report	Report	3/month

- Load-based WQBELs from TMDL, but still report concentrations for optimization of treatment process and as a check.
- Increased frequency of sampling should get more representative *averages*.
- \* **Compliance Schedule for TN:** "The permittee shall submit quarterly progress reports, to both EPA and NMED.... Attain final effluent limitations for Total Nitrogen no later than one (1) year from the permit effective date."

#### ZERO exceedances reported for TN and TP!



## NM's Second Iteration of Nutrient TMDL Implementation

### PHASED TMDLs:

Rio Chamita TMDL (2011)

Phase 1 WLA: TN = 4 mg/L; TP = 0.4 mg/L

Phase "n" WLA: TN = 1 mg/L; TP = 0.1 mg/L

The Village of Chama received \$8M from state legislature to build new WWTP that was completed in October 2017.

### Pajarito Creek TMDL (2011)

Phase 1 WLA: TN = 8 mg/L; TP = 1 mg/L Phase 2 WLA: TN = 3 mg/L; TP = 0.1 mg/L Phase "n" WLA: TN = 0.38 mg/L; TP = 0.03 mg/L



### Rio Chamita – Subsequent Permit Requirements

#### NM0027731 – Village of Chama WWTP; effective Nov 2011 – Oct 2016

Pollutant	30-D Avg LOAD	Daily Max LOAD	30-D Avg CONC	Daily Max CONC	Frequency
Nitrogen, Total Oct 1 – Apr 30	25.0 lb/d	Report	10 mg/L	15 mg/L PHASE 1 LIM	2/month <b>TS</b>
Nitrogen, Total May 1 – Sep 30	10.0 lb/d	Report	4.0 mg/L	6.0 mg/L	2/month
Phosphorus, Total Oct 1 – Apr 30	2.5 lb/d	Report	1.0 mg/L	1.5 mg/L	2/month
Phosphorus, Total May 1 – Sep 30	1.0 lb/d	Report	0.4 mg/L	0.6 mg/L	2/month

Seasonal limits "effective from the day before the permit expiration date and lasting until the permit expiration date."



### Rio Chamita – Subsequent Permit Requirements

#### NM0027731 – Village of Chama WWTP; effective Oct 2017 – Sep 2022

Pollutant	30-D Avg LOAD	Daily Max LOAD	30-D Avg CONC	Daily Max CONC	Frequency
Nitrogen, Total Year Round	Report	Report	Report	Report	2/month
Nitrogen, Total Oct 1 – Apr 30*	25 lb/d	Report	10 mg/L	15 mg/L	2/month
Nitrogen, Total May 1 – Sep 30*	10 lb/d	Report	4.0 mg/L	6.0 mg/L	2/month
Phosphorus, Total Year Round	Report	Report	Report	Report	2/month
Phosphorus, Total Oct 1 – Apr 30*	2.5 lb/d	Report	1.0 mg/L	1.5 mg/L	2/month
Phosphorus, Total May 1 – Sep 30*	1.0 lb/d	Report	0.4 mg/L	0.6 mg/L	2/month



### Pajarito Creek – Subsequent Permit Requirements

#### NM0020711 – City of Tucumcari WWTP; effective Oct 2015– Sep 2020

Pollutant	30-D Avg LOAD	Daily Max LOAD	30-D Avg CONC	Daily Max CONC	Frequency
Nitrogen, Total	61.4ª lb/d 23.0 <sup>b</sup> 3.45 <sup>c</sup>	N/A	8.0 <sup>a</sup> mg/L 3.0 <sup>b</sup> 0.45 <sup>c</sup> PI	N/A H <mark>ASE 1 LIMI</mark>	1/2 weeks
Phosphorus, Total	7.67 <sup>a</sup> lb/d 0.77 <sup>b</sup> 0.23 <sup>c</sup>	N/A	1.0 <sup>a</sup> mg/L 0.1 <sup>o</sup> 0.03 <sup>c</sup>	N/A	1/2 weeks

- **a. Phase 1** limits shall be effective at permit expiration date if discharge occurs. Zero discharge is expected at expiration date.
- **b. Phase 2** limits are contingent. Compliance date will be set if permit is renewed.
- **c. Phase n** limits are contingent. Compliance date will be set after effective date of phase 2 limits is known.



### Another Implementation Tool: Nutrient Temporary Standards

- Nutrient concentrations necessary to protect water quality are below the limits of technology (typically little to no dilution capacity in NM streams)
- Needed to create a clear path to compliance that is achievable and affordable in the near-term and encourages incremental improvements to water quality in the medium and longer-term
- Recognized that a temporary standard (aka "variance") could help NM address nutrient management in permits and TMDLs.



# **Temporary Standards in NM**

- Temporary standard (NM) = WQS variance (federal)
  - **20.6.4.10.F NMAC**
  - **40** CFR 131.14
- A time-limited designated use and criterion that reflects the highest attainable condition during the term of the temporary standard.
- A regulatory mechanism that allows progress toward attaining underlying designated use and criterion and helps address nutrient management to achieve significant nutrient reductions.
- A temporary standard is a change to the WQS.



### Temporary Standard "Factor 6" Demonstration Project – Raton WWTP

**PROJECT TEAM:** NM Environment Dept; USEPA Standards and Health Protection Division in Washington, DC; USEPA Region 6 in Dallas, and EPA's contractors Tetra Tech and EcoNorthwest.

Reverse Osmosis (RO) is the only technology that approaches the underlying numeric nutrient thresholds.

- Cost of installing RO to meet underlying WQS would lead to substantial and widespread economic and social impact [40 CFR 131.10(g) Factor 6].
- Evaluated six possible technology options to determine the highest attainable condition (HAC) – four with substantial impacts; two with impacts "unclear"
- It was determined that the City of Raton could afford additional optimization and chemical precipitation.
- The highest attainable condition (HAC) is represented as "the interim effluent condition that reflects the greatest pollutant reduction achievable."
  - ✓ Total Nitrogen: 5.0 mg/L long-term avg; 8.0 mg/L 30-day avg
  - ✓ Total Phosphorus: 1.0 mg/L long-term avg; 1.6 mg/L 30-day avg



# Wrapping Up

- There are reasonable and effective ways to monitor and assess a stream for nutrients.
- NM's approach provides a robust methodology to confidently assess standards attainment in our surface waters.
- TMDLs should be written to nutrient targets/thresholds that are protective of the stream and scientifically defensible.
- Implementation of TMDLs through the permit process should be flexible such that treatment improvements are required but there is a recognition of the limits of technology for nutrient treatment.
- A bunch of tools in your implementation toolbox are needed:
  - Phased implementation/Phased TMDLs
  - Longer compliance schedules
  - Seasonal/Temperature-dependent effluent limits
  - Load-only effluent limits (report concentrations)
  - Variance/Temporary Standard



### **Questions?**



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