New Mexico Environment Department

NM's Hydrology Protocol for Surface Water Quality Management

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WOTUS Regional Concept Pre-Workshop #2

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OUTLINE

- Why did NM develop the Hydrology Protocol?
- What is the Hydrology Protocol?
- How does the Hydrology Protocol work?
- How are streams scored using the Protocol?
- Public Participation
- Hydrology Protocol Guidelines

The NEED for the *Hydrology Protocol*

- New Mexico's water quality standards (WQS) set distinct protections for ephemeral, intermittent, and perennial waters (20.6.4.97 - 99 NMAC).
- New Mexico's WQS also identify many classified waters by their hydrology. For example, "perennial tributaries to" or "perennial reaches of" (20.6.4.101 to 899 NMAC).
- NMED developed the *Hydrology Protocol* to evaluate the natural hydrologic conditions of a waterbody.

How does *HP* fit into Bureau processes?

- The *Hydrology Protocol* (HP) is a quick and easy qualitative field methodology.
- The HP generates scientific technical support to determine the hydrology of a stream or river.
- Hydrologic determinations are key to assuring that the appropriate protections (i.e., designated uses and water quality criteria) are applied to a particular stream or river.

Hydrologic Definitions

The *Hydrology Protocol* is based on the definitions of "ephemeral," "intermittent," and "perennial" adopted in NM's surface water quality regulations, as follows:

- ***"Ephemeral"*** *...means the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region.*
- ***"Intermittent"*** *...means the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow.*
- ***"Perennial"*** *...means the water body typically contains water throughout the year and rarely experiences dry periods.*

How does the *Hydrology Protocol* work?

The protocol relies on hydrologic, geomorphic and biological indicators of the persistence of water and is organized into two levels of evaluations.

1. ***Level 1 Evaluation*** *should provide enough information to give a clear indication of the hydrologic status of the stream.*
2. ***Level 2 Evaluation*** *relies on more focused, quantitative data collection efforts and may be used to make a final hydrologic determination if the Level 1 Evaluation is inconclusive (or to provide supporting documentation). Level 2 includes benthic macroinvertebrate and fish collections, as well as other presence/absence data.*

How does the *Hydrology Protocol* work?

In the Level 1 evaluation, fourteen (14) different attributes are evaluated and assigned a numeric score using a four–tiered, weighted scale (strong, moderate, weak, or absent).

- **Hydrologic indicators** include water in the channel, riffle-pool sequences, hydric soils, evidence of sediment/debris transport, and seeps/springs.
- **Geomorphic indicators** include sinuosity, floodplain and channel dimensions, substrate particle size and sorting.
- **Biological indicators** include the presence or absence of fish, benthic macroinvertebrates, algae/periphyton, vegetation within/near the stream channel, and iron-oxidizing bacteria.

SCORING

Table 1. Guide to Scoring Categories

Category	Description
Strong	The characteristic* is easily observable (i.e. observed within less than one minute of searching).
Moderate	The characteristic is present and observable with minimal (i.e. one or two minutes) searching.
Weak	The characteristic is present, but you have to search intensely (i.e., ten or more minutes) to find it.
Poor	The characteristic is not observed.

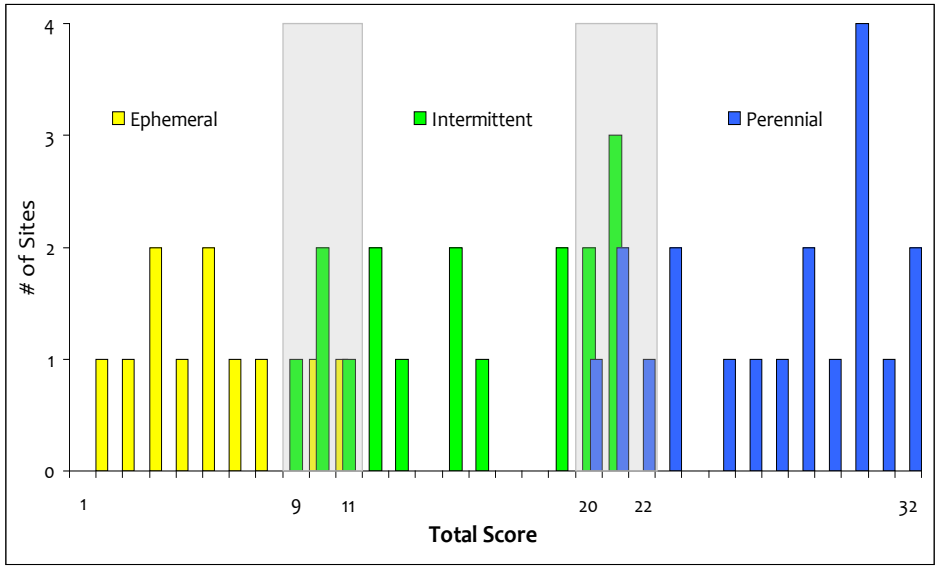
*geomorphic, hydrological or biological

SCORING

- Those indicators that were found to have a statistical difference between hydrologic conditions are scored on the HP *Field Sheet*.
- NMED uses *Field Sheet*, scores, notes, and photo documentation to support a hydrologic determination.

LEVEL 1 INDICATORS	Stream Condition (identify all that apply then choose most prominent score)			
	Strong	Moderate	Weak	Poor
1.7 Sinuosity of Segment (for length no less than two meanders)	☐ Calculated ratio > 1.4 ☐ Numerous closely spaced bends ☐ Few straight sections	☐ Calculated ratio 1.4 <> 1.2 ☐ Mostly bends ☐ Some straight sections	☐ Calculated ratio 1.2 <> 1.0 ☐ Few bends ☐ Mostly straight sections	☐ Calculated ratio = 1.0 ☐ Completely straight
	3	2	1	0
	☐ Calculated ☐ Observed	Notes/Comments:		
1.8 Floodplain and Channel Dimensions	☐ Calculated ratio > 2.5 ☐ Minimally confined ☐ Wide, active floodplain	☐ Calculated ratio 2.5 <> 1.2 ☐ Moderately confined ☐ Floodplain active during larger events		☐ Calculated ratio < 1.2 ☐ Incised/confined channel ☐ Flooplain absent or narrow ☐ Floodplain not connected
	3	1.5		0
	☐ Calculated ☐ Observed	Notes/Comments:		
1.9 In-Channel Structure: Riffle-Pool Sequence	☐ Frequent number of riffle and pools observed throughout reach ☐ Obvious transition between riffles and pools	☐ Less frequent number of riffle and pools ☐ Transition between riffles and pools difficult to distinguish	☐ Mostly has areas of pools or of riffles	☐ No riffles or pools observed
	3	2	1	0
	Notes/Comments:			
				SUBTOTAL (1.1-1.9)
1.10 Particle Size or Stream Substrate Sorting	☐ Particle sizes in the channel are noticeably different from particle sizes outside the channel in the flood-prone area. ☐ Clear distribution of various sized substrates in the stream channel.	☐ Particle sizes in the channel are moderately similar to particle sizes outside the channel in the flood-prone area. ☐ Various sized substrates are present in the stream channel. ☐ Higher ratio of larger particles (gravel/cobble).		☐ Particle sizes in the channel are similar or comparable to particle sizes outside the channel in the flood prone area. ☐ Substrate sorting is not readily observed in the stream channel.
	3	1.5		0
	☐ Calculated ☐ Observed	Notes/Comments:		
1.11 Hydric Soils Within Flood-Prone Area	☐ Hydric soils were observed in reach		☐ Hydric soils were not observed in reach	
	3		0	
	Notes/Comments:			
1.12 Sediment on Plants and Debris	☐ Sediment found readily on plants and debris in: ☐ channel ☐ streambank ☐ floodplain	☐ Sediment found but not prevalent on plants and debris. ☐ Sediment mostly accumlated on plants and debris in pools	☐ Sediment on plants and debris is isolated in small amounts along the sample reach.	☐ No sediment is present on plants or debris.
	1.5	1	0.5	0
	Notes/Comments:			
1.13 Seeps and Springs	☐ Seeps and/or springs present in reach		☐ Seeps and/or springs not present in reach	
	1.5		0	
	Notes/Comments:			
1.14 Iron Oxidizing Bacteria/Fungi	☐ Iron-oxizing bacteria/fungi present in reach		☐ Iron-oxizing bacteria/fungi not present in reach	
	1.5		0	
	Notes/Comments:			
				TOTAL POINTS (1.1-1.14)

Level 1 Total Score



- Based on data collected in 2008/9 at 57 sites with known hydrology, thresholds were established for scoring.
- Areas of overlap (i.e., gray zones) are assumed to be the "higher" use, unless a Level 2 analysis is completed.

** If macroinvertebrates and/or fish are present, then the stream is at least intermittent.*

Waterbody Type	Level 1 Total Score	Stream Determination
Ephemeral	**Less than 9.0***	**Stream is ephemeral**
	≥ 9.0 and < 12.0	Stream is recognized as **intermittent until further analysis**
Intermittent	**≥ 12.0 and ≤ 19.0**	**Stream is intermittent**
	> 19.0 and ≤ 22.0	Stream is recognized as **perennial until further analysis**
Perennial	**Greater than 22.0**	**Stream is perennial**

EXAMPLES…


Arroyo Chamiso - ephemeral


Apache Creek –
ephemeral/intermittent


Gallinas Creek –
intermittent/perennial


San Francisco River –
perennial

Hydrology Protocol Guidelines

- The field evaluator should have experience making hydrologic, geomorphic, and biological observations in New Mexico or the semi-arid region of the southwestern U.S.
- Field evaluations should be performed at least 48 hours after the last known major rainfall or snowmelt event.
- In addition, it is *strongly* recommended that field evaluations be conducted outside of drought conditions whenever possible.

***The HP and scoring mechanism were designed with redundancy (i.e., multiple indicators) to allow for satisfactory scores even after a recent rainfall or during drought conditions but performing field evaluations under these conditions is not optimal nor recommended.*

Public Participation and the *HP*

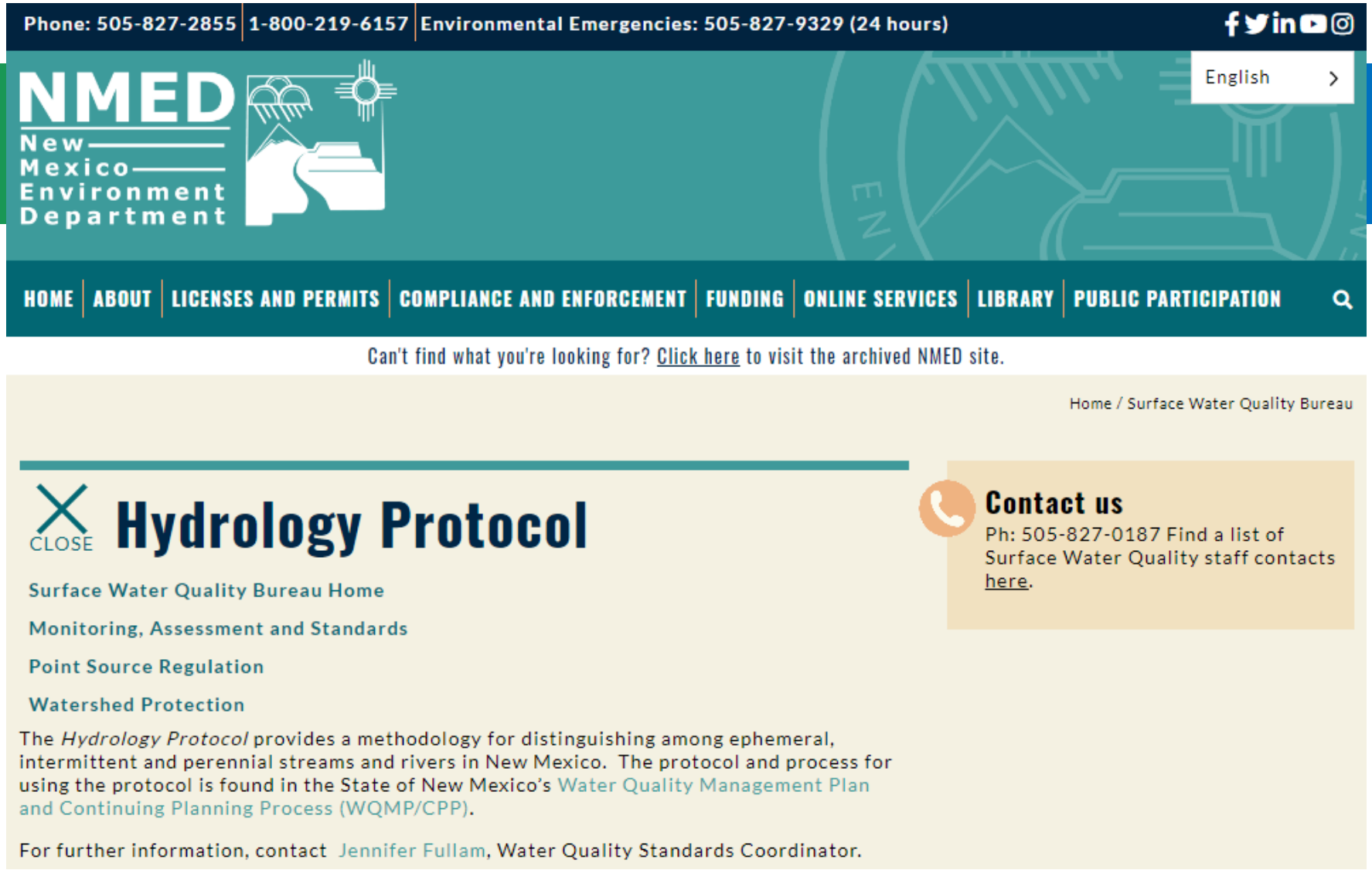
The *Hydrology Protocol* went through two rounds of public comment and was approved as an appendix to the State's Water Quality Management Plan (WQMP) by the NM Water Quality Control Commission on May 10, 2011.

EPA approved New Mexico's WQMP with associated appendices on December 23, 2011.

SUMMARY

- The Federal Clean Water Act and NM's Water Quality Act requires development of water quality standards, assessment of water quality, issuance of permits for discharges into surface waters, and development of TMDLs for impaired waters.
- The *Hydrology Protocol* uses hydrologic, geomorphic, and biological indicators to distinguish between ephemeral, intermittent, and perennial streams and rivers in New Mexico.
- The *Hydrology Protocol* is designed to help make hydrologic determinations to ensure that the appropriate protections (i.e., designated uses and water quality criteria) are applied to a particular stream or river.

https://www.env.nm.gov/surface-water-quality/protocols-and-planning/



Questions?

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