USE ATTAINABILITY ANALYSIS
AQUATIC LIFE USE DESIGNATION FOR TECOLOTE CREEK, U.S. INTERSTATE 25 (I-25) TO BLUE CREEK, SAN MIGUEL COUNTY, NM

NEW MEXICO ENVIRONMENT DEPARTMENT
SURFACE WATER QUALITY BUREAU
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Cover photos: Left, Tecolote Creek at Blue Haven Camp, June 24, 2016; Right, Tecolote Creek at I-25, June 24, 2016; Photo credit: SWQB staff

USE ATTAINABILITY ANALYSIS
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INTRODUCTION

The New Mexico Environment Department's (NMED) Surface Water Quality Bureau (SWQB) conducted a Use Attainability Analysis (UAA) to determine the most appropriate and protective aquatic life use (ALU) for Tecolote Creek, San Miguel County, New Mexico. This UAA concludes that coolwater aquatic life is the most protective ALU that is attainable in the Assessment Unit (AU) Tecolote Creek (I-25 to Blue Creek). The high quality coldwater (HQCW) ALU is not attainable because "naturally occurring pollutant concentrations (i.e., high water temperatures resulting from ambient air temperatures) prevent the attainment of the [coldwater aquatic life] use." (40 C.F.R. § 131.10(g)(1)).

Section 101(a)(2) of the Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1387, ("Clean Water Act" or CWA) requires that, wherever attainable, water quality shall provide for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water. These are often referred to as the 'fishable, swimmable' uses for a water body. In order to remove a §101(a)(2) use or change a §101(a)(2) use to a more appropriate designation with less stringent criteria, a state or tribe must conduct a UAA demonstrating that the use is not attainable due to one or more of the six factors listed in 40 CFR§131.10(g) (see Appendix A). The UAA determines the most protective aquatic life and/or contact uses that are attainable. New Mexico's UAA procedure is described in 20.6.4.15 NMAC.

As defined in 20.6.4.7 NMAC, the State of New Mexico's water quality standards classify surface waters of the state into "segments". Each segment has several designated uses[1], including one of seven aquatic life designated uses, which are descriptive of the conditions, including thermal ranges, that should be attainable if not already existing, to support biotic communities. These aquatic life use criteria are specified in 20.6.4.900 NMAC (see Appendix B**)**.

Each segment contains one or more AUs, which are water bodies or sections of a water body with similar characteristics. These AUs are designed to represent surface waters with homogenous water quality (WERF 2007). Tecolote Creek has been divided into three AUs (Table 1 on page 4): from its confluence with the Pecos River upstream to U.S. Interstate 25 (I-25); from I-25 upstream to Blue Creek; and from Blue Creek upstream to the headwaters. The two AUs upstream of I-25 are currently identified in water quality standards segment 20.6.4.215 NMAC:

[1] Designated use means a use specified in 20.6.4.97-899 NMAC for a surface water of the state whether or not it is attained. 20.6.4.7.D(3) NMAC.

20.6.4.215 PECOS RIVER BASIN - Perennial reaches of the Gallinas river and all its tributaries upstream of the diversion for the Las Vegas municipal reservoir and perennial reaches of Tecolote creek and its perennial tributaries.

A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat, industrial water supply and primary contact; and public water supply on the Gallinas river.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 300 µS/cm or less (450 µS/cm or less in Wright Canyon creek); the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

Tecolote Creek from the Pecos River to I-25 is identified as an unclassified non-perennial water and, until a hydrology protocol is conducted, it is by default classified as intermittent and therefore required to meet the water quality standards of 20.6.4.98 NMAC:

20.6.4.98 INTERMITTENT WATERS - All non-perennial unclassified waters of the state, except those ephemeral waters included under 20.6.4.97 NMAC.

A. Designated Uses: livestock watering, wildlife habitat, marginal warmwater aquatic life and primary contact.

B. Criteria: the use-specific criteria in 20.6.4.900 NMAC are applicable to the designated uses, except that the following site-specific criteria apply: the monthly geometric mean of E. coli bacteria 206 cfu/100 mL or less, single sample 940 cfu/100 mL or less.

Tecolote Creek (I-25 to Blue Creek) is listed as impaired due to temperature exceedences. It was first listed as impaired due to temperature in 1998. Recent thermograph data from 2010 and 2016 confirmed the impairment and it has remained on the list of impaired waters in subsequent years (NMED/SWQB 2016). However, NMED noted in the Record of Decision that the HQCW ALU may not be appropriate and a review of the segment specific use was warranted (NMED/SWQB, 2016). Perennial reaches of Tecolote Creek are also listed as impaired due to the segment-specific specific conductance (SC) criterion. The SC criterion is part of the HQCW ALU designation. The purpose of this UAA is to identify the appropriate aquatic life use for Tecolote Creek upstream of I-25 to Blue Creek. The SC criterion will no longer apply if an ALU change is supported by the preponderance of the evidence evaluated in this UAA investigation.

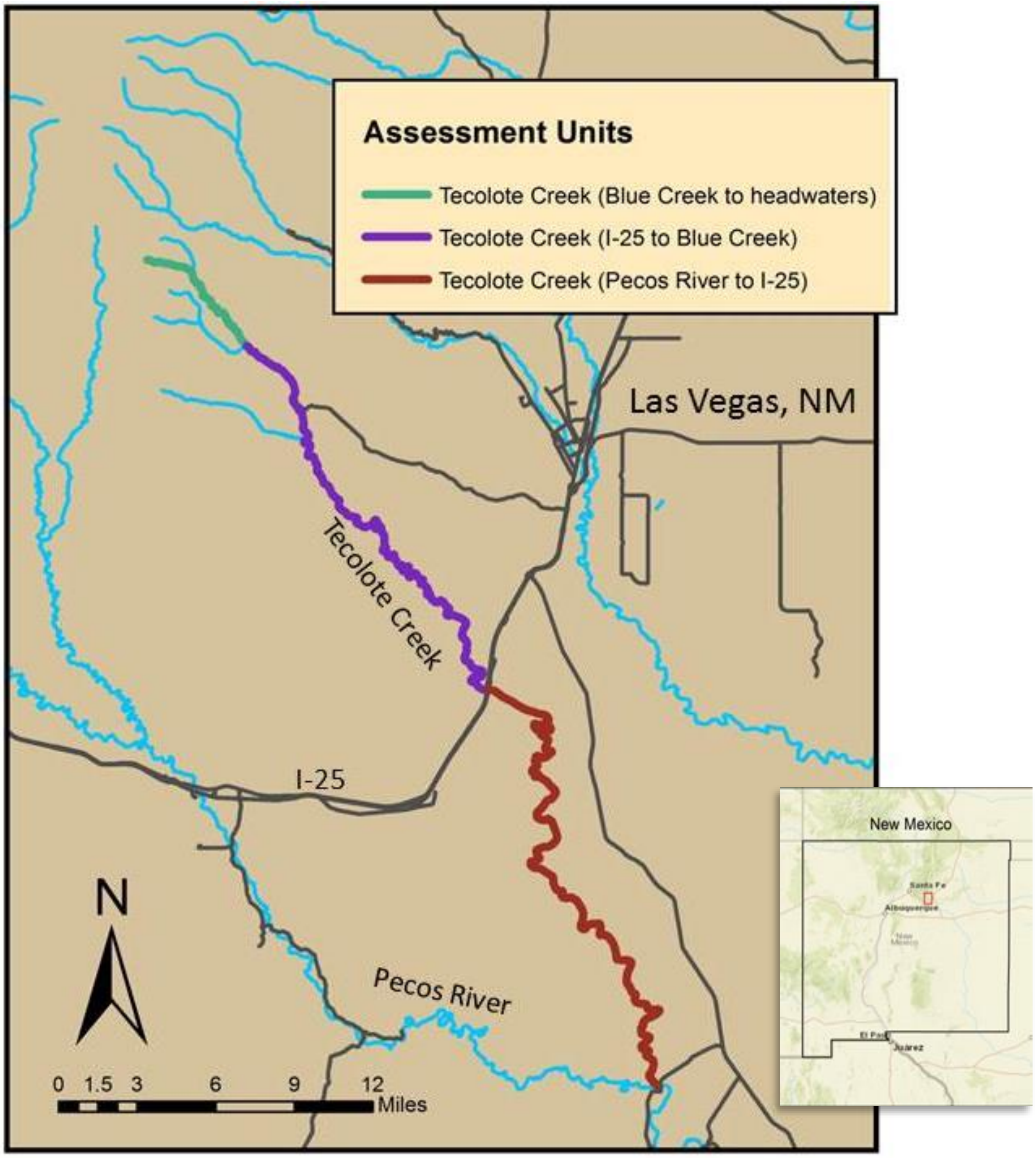


Figure 1. Tecolote Creek Assessment Units.

Table 1. SWQB Assessment Units on Tecolote Creek

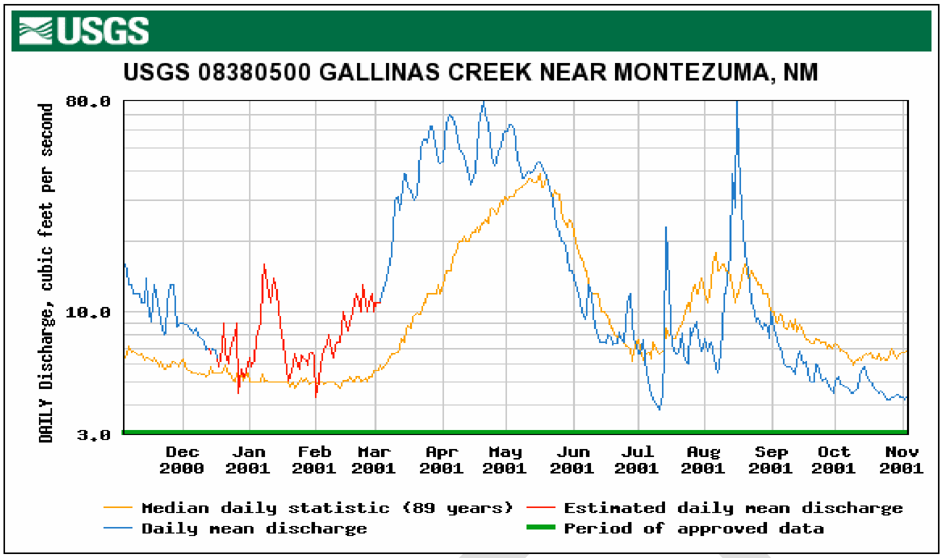
Assessment Unit Name	Assessment Unit Identifier	Length of AU (miles)	Current Aquatic Life Use
Tecolote Creek (Blue Creek to headwaters)	NM-2212_09	6	High quality cold water
Tecolote Creek (I-25 to Blue Creek)	NM-2212_10	22	High quality cold water
Tecolote Creek (Pecos River to I-25)	NM-2212_08	26	Marginal warm water

WATERSHED DESCRIPTION AND HISTORY

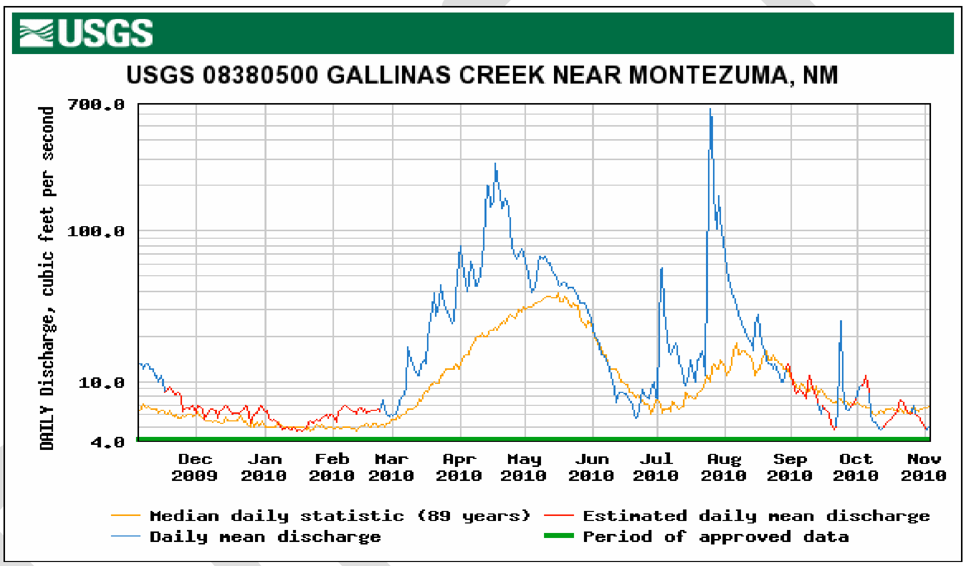
Tecolote Creek is located within the Pecos Headwaters watershed (HUC 13060001) in northern New Mexico. The Tecolote Creek watershed area is 284 square miles (mi^2) and Tecolote Creek has a total reach of 54 miles. It arises from the southeast slope of Elk Mountain in the southernmost portion of the Rocky Mountain Range in the Sangre de Cristo Mountains, flowing downstream to its confluence with the Pecos River at Tecolotito, NM. The creek originates in sub-alpine forest above 9400 feet (ft.) in elevation, then descends into mid-elevation mixed conifer and ponderosa pine forest. Tecolote Creek continues to flow through piñon-juniper woodlands and savannas, crossing I-25, where it becomes non-perennial for 26 miles until joining the Pecos River at an elevation of 5340 ft. Tributaries to Tecolote Creek include Falls Creek, Blue Creek and Wright Canyon Creek.

Settlement, and presumably irrigation diversion, began on Tecolote Creek in 1824, with the submission and approval of an application to establish the Tecolote Land Grant (Bowden, undated). The Tecolote Land Grant includes land on both sides of what is now the I-25 corridor. Higher up in the watershed, the Las Vegas Land Grant (issued in 1835) includes the Tecolote Creek channel from the north boundary of the Tecolote Land Grant upstream to the village of Geronimo.

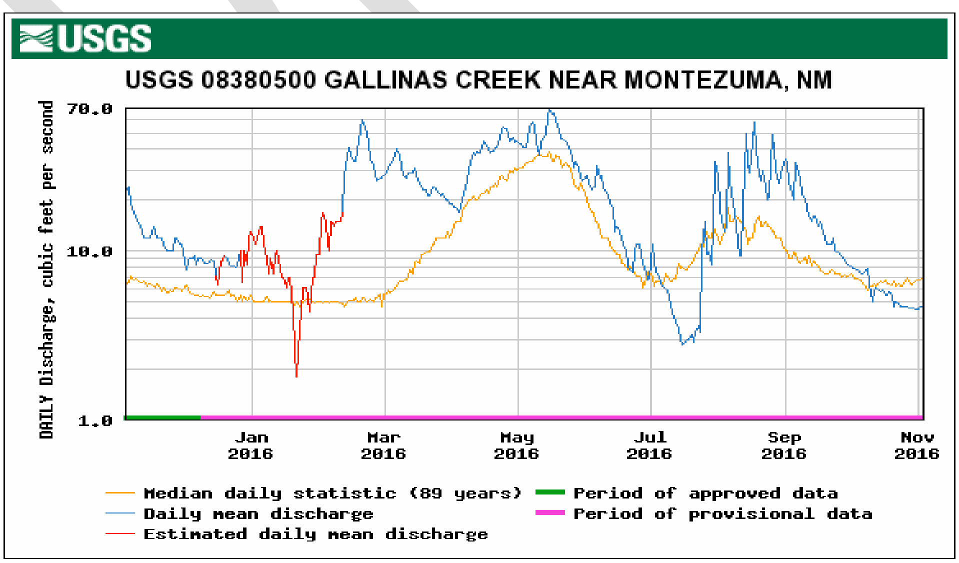
The 2001 SWQB survey report notes that "Tecolote Creek becomes increasingly degraded as it flows downstream from the Santa Fe National Forest boundary" (NMED/ SWQB, 2001). The creek is impacted by both the clearing of riparian vegetation and stream diversion for irrigation. There are no U.S Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) Individual Permits with discharges to Tecolote Creek. Mining activities with stormwater discharges to Tecolote Creek may be eligible for coverage under a NPDES Multi Sector General Permit (MSGP); however, currently there is only one industry with MSGP coverage in the watershed, Howard's Sand and Gravel, located just downstream of I-25. The MSGP requires preparation of a stormwater pollution prevention plan, which includes specific conditions to limit or eliminate pollutants associated with the industrial activities to minimize impact to water quality. Water rights in the Tecolote watershed have not been abstracted by the New Mexico Office of the State Engineer (NMOSE, 2013). Additional impacts to the creek include the Tecolote wildfire, which burned 812 acres in the upper Blue Creek watershed from June 6 to June 21, 2010.


USGS
USGS 08380500 GALLINAS CREEK NEAR MONTEZUMA, NM
DAILY Discharge, cubic feet per second
80.0
10.0
3.0
Dec 2000
Jan 2001
Feb 2001
Mar 2001
Apr 2001
May 2001
Jun 2001
Jul 2001
Aug 2001
Sep 2001
Oct 2001
Nov 2001
Median daily statistic (89 years)
Estimated daily mean discharge
Daily mean discharge
Period of approved data

A


USGS
USGS 08380500 GALLINAS CREEK NEAR MONTEZUMA, NM
DAILY Discharge, cubic feet per second
700.0
100.0
10.0
4.0
Dec 2009
Jan 2010
Feb 2010
Mar 2010
Apr 2010
May 2010
Jun 2010
Jul 2010
Aug 2010
Sep 2010
Oct 2010
Nov 2010
Median daily statistic (89 years)
Estimated daily mean discharge
Daily mean discharge
Period of approved data

B


USGS
USGS 08380500 GALLINAS CREEK NEAR MONTEZUMA, NM
DAILY Discharge, cubic feet per second
70.0
10.0
1.0
Jan 2016
Mar 2016
May 2016
Jul 2016
Sep 2016
Nov 2016
Median daily statistic (89 years)
Period of approved data
Daily mean discharge
Period of provisional data
Estimated daily mean discharge

C

Figure 2. Discharge from the nearest USGS gauge, compared with median daily statistics, for water years (A) 2001, (B) 2010 and (C) 2016.

In order to characterize streamflow conditions in which the thermograph data were collected, discharge from the closest USGS gage, 08380500 – Gallinas Creek near Montezuma, NM was analyzed. The Gallinas watershed has similar characteristics of watershed size, drainage area, and elevation. This gage is located 9 kilometers (km) from the nearest point on Tecolote Creek, at a similar latitude and elevation as Tecolote Creek between Blue Creek and San Geronimo (see Figure 3). The three years of thermograph data used for comparison (2001, 2010 and 2016) all had greater than average spring snowmelt runoff. The summer of 2001 appears to have had slightly less than average flow, while summer 2010 included two large storm events resulting in greater than average flow, and summer 2016 included a dryer-than-normal spell of approximately three weeks' duration.

ECOREGIONAL ANALYSIS

Ecoregions denote areas of general similarity in ecosystems and in the type, quality and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management and monitoring of ecosystems and ecosystem components. In recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance (Omernik, 1995).

The two AUs on Tecolote Creek above I-25 flow through two (2) level III ecoregions (Level III Ecoregion 21-Southern Rockies and Ecoregion 26-Southwestern Tablelands) and five (5) Level IV ecoregions (Griffith et al, 2006) as shown on Figure 3. The Tecolote Creek headwaters originate in the mountains within Level IV Ecoregions 21b (M) and 21c (M). The AU upstream of Blue Creek (NM-2212_09) is entirely within the Mountains category. The AU from I-25 to Blue Creek (NM-2212_10) is roughly evenly divided between Ecoregions 21f (M), 21d (F), and 26h (X). The mapped point where the transition between Ecoregions 21f (M) and 21d (F) occurs is just above San Geronimo, at approximately 6,800 ft. elevation (Figure 3). Observations of streambed characteristics and surrounding vegetation support the existence of an ecoregion transition at this location. As noted, the Tecolote Creek sampling station at I-25 is within Ecoregion 26h (X), approximately 8.7 linear km downstream of the transition point from Ecoregion 21d (F). The characteristics of these ecoregions are summarized in Table 2.

The various Level IV ecoregions in New Mexico have been classified in three sedimentation categories – Mountain (M), Foothills (F), and Xeric (X) - based on principal component analysis of habitat variables (Jessup, et al. 2010). For streams that support their designated aquatic life use, these ecoregion categories roughly correspond to the ALU designations of HQCW/coldwater, coolwater and warmwater/marginal warmwater, respectively (Jessup et al. 2010).

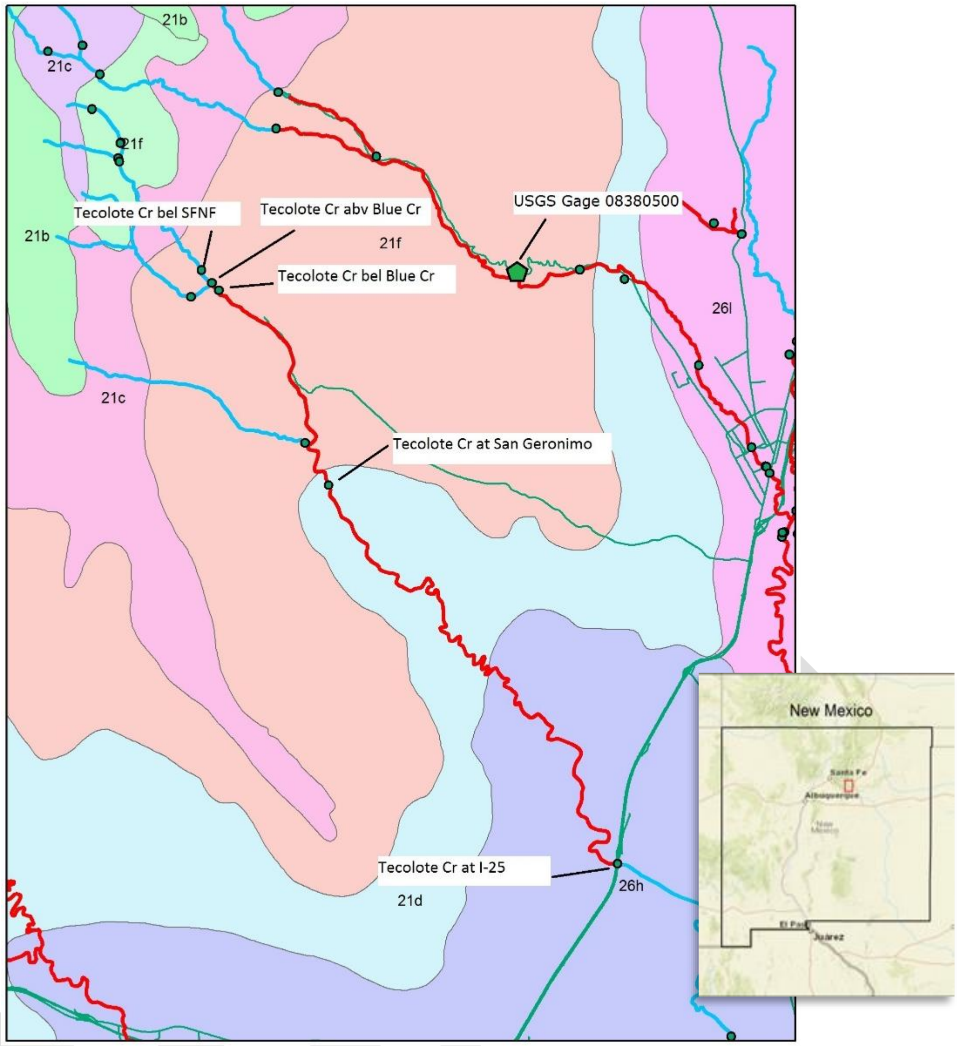


Figure 3. Tecolote Creek above I-25, showing USEPA Level IV ecoregions, USGS Gage 08380500-Gallinas Creek near Montezuma and selected SWQB monitoring stations. Impaired Assessment Units are shown in red.

Table 2. Characteristics of the Tecolote Creek watershed ecoregions

Code	**Name (category)**	**Elevation (ft.)**	**Physiography**	**Hydrology**	**Annual precip (in.)**	Mean July Max Temp (°C)
21	Level 3 Ecoregion - Southern Rockies					
21b	Crystalline Subalpine Forests (Mountains)	Mostly 9000 - 11,500	High mountains with steep slopes	High gradient perennial streams	24-40 deep winter snowpack	21

21c	Crystalline Mid-Elevation Forests (Mountains)	7600 – 10,100	Low mountain ridges, slopes, and outwash fans.	Moderate to high gradient perennial streams	18-28	24
21d	Foothill Woodlands and Shrublands (Foothills)	Mostly 6000-8500; 9600 max	Hills, ridges, and footslopes.	Moderate to high gradient perennial, intermittent, and ephemeral streams	12-20	29
21f	Sedimentary Mid-Elevation Forests (Mountains)	6800-9900	Low mountain ridges, slopes, and outwash fans	Moderate to high gradient perennial streams	16-29	26
26	Level 3 Ecoregion - Southwestern Tablelands					
26h	Pinyon-Juniper Woodlands and Savannas (Xeric)	5000-8720	Dissected plains and tablelands with some scattered ridges and hills	Mostly intermittent streams and some perennial streams that are spring-fed or that originate in mountain ecoregions.	12-16	32

Figure 4. Aerial view of the juncture of Tecolote Creek with Blue Creek, showing changes in topography and land use below the confluence.

AIR-WATER TEMPERATURE CORRELATION MODEL

DESCRIPTION OF THE MODEL

Numeric water quality temperature criteria for specific aquatic life uses under New Mexico's water quality standards are expressed in terms of maximum temperature (T_{MAX}), the temperature not to be exceeded for four or more consecutive hours in a 24-hour period on more than three consecutive days (4T3), and the temperature not to be exceeded for six or more consecutive hours in a 24-hour period on more than three consecutive days (6T3) (20.6.4.7 NMAC and 20.6.4.900.H NMAC, Table 2). The Maximum Weekly Average Temperature (MWAT) is a measure of chronic temperature trends calculated from daily temperature measurements averaged over the seven contiguous days of highest daily averages from the record. New Mexico's water quality standards do not require the use of the MWAT for temperature assessments; however, the MWAT statistic is widely adopted and a large body of comparative literature exists relating MWAT to thermal requirements of freshwater fish (Brungs and Jones, 1977).

Table 2. Aquatic life use temperature criteria (°C) (20.6.4.900.H NMAC)

Criterion	High Quality Coldwater	Coldwater	Marginal Coldwater	Coolwater	Warmwater	Marginal Warmwater
4T3	20	-	-	-	-	-

6T3	-	20	25	-	-	-
T_{MAX}	23	24	29	29	32.2	32.2

A dash (-) indicates that the criterion is not applicable to the aquatic life use.

The T_{MAX}, 4T3, 6T3 and MWAT are summary statistics derived from water temperature datasets as recorded by thermographs. Thermographs are dataloggers that can record water or air temperatures continuously at preset temporal intervals (*e.g.*, hourly) over extended periods of time (e.g., several months). NMED deploys thermographs in a water body throughout the summer months in accordance with the Department's Standard Operating Procedure 6.3, and assesses the validated data to identify impairments.

Air temperatures, either modeled or measured, are more readily available and spatially representative than periodic and spatially limited stream temperature datasets. Due to the limited availability of stream temperature datasets, the SWQB has developed an Air-Water Temperature Correlation (AWTC) model for New Mexico streams. The AWTC model allows for the estimation of attainable MWAT, T_{MAX}, 4T3 and 6T3 water temperatures given the 30 year July average ambient air temperature (ATEMP) for a given area (NMED/SWQB, 2011). The model was based on recorded thermograph data from 293 New Mexico stream locations and assumes that, in streams which do not receive groundwater inputs sufficient to change the water temperature, air temperature has the greatest influence on stream temperature (Bartholow, 2002). The model uses average July temperatures because July is the month in which the highest annual temperatures typically occur. In the absence of site-specific measured data, air temperature inputs to the AWTC were obtained using the Parameter-elevation Regression on Independent Slopes Model (PRISM). PRISM predicts air temperatures based on site-specific characteristics (PRISM Climate Group, 2004; Daly et al, 2008). It has been shown through the AWTC that absent appreciable influence of microclimates and ground water, ATEMP as determined through PRISM is nearly equivalent to the MWAT. The T_{MAX}, 4T3 or 6T3 can be calculated from ATEMP using correlation equations.

Sources of potential error in the AWTC model include: (1) The PRISM record of July temperatures used in the model are averaged for a period of 30 years between 1981-2010. Averaging may smooth extremes and obscure trends in the modeled temperature record. This, in combination with inter-annual variation in the water temperature record could lead to differences between the observed and predicted results; and, (2) The PRISM model interpolates values based on a minimum 800meter (m) map grid cell (640,000 m^2). In mountainous areas in particular, it integrates data from a range of elevations which may reduce the precision of the results.

APPLICATION TO TECOLOTE CREEK

Average July temperatures at each Tecolote Creek monitoring station were obtained from PRISM for the reference period 1981-2010 using the settings for 800 m grid cells with interpolation. The AWTC was then used to predict T_{MAX}, 4T3and 6T3. NMED also conducted water temperature monitoring of Tecolote Creek using thermographs in 2001, 2010 and 2016. Modelled (predicted) results and thermograph measurements (observed) are shown on Tables 4a and 4b**.**

To incorporate consideration of annual variability, records for the nearest National Weather Service (NWS) station were consulted to determine how the years when SWQB collected data compared to the reference period (1981-2010) for PRISM data. That station is located at the Pecos National Historical Park (station ID COOP:296676), and is approximately 23 km away from the nearest point on Tecolote Creek and at a similar elevation and latitude as the SWQB San Geronimo monitoring station. For 2001, July mean temperature departure from the 1981-2010 normal was +1.6 °C. Data points for departure from normal were missing for June and July of 2010; however, May and August were 0.7 and 0.9 °C warmer, respectively, than the reference period. Therefore, an averaged correction factor of +0.8 °C was applied on Table 4b to adjust the July average temperature in that year for departure from normal. NWS data from the 2016 weather year is not yet available for comparison with the thermograph data most recently collected by SWQB from Tecolote Creek. The adjustment process improved the accuracy of the AWTC model (reduced the difference between predicted and observed values) at predicting T_{MAX}, 4T3and 6T3 for the AU from I-25 to Blue Creek, illustrating that in warmer-than-average years actual water temperatures are likely to exceed the values modelled using ATEMP.

Table 4a. Unadjusted Air-Water Temperature Correlation Model Predicted Temperatures for Tecolote Creek in °C

Monitoring Station	Year	ATEMP(a) °C	T_{MAX} (P/O)(b) °C	4T3 (P/O)(b) °C	6T3 (P/O)(b) °C
Tecolote Creek (Blue Creek to headwaters): NM-2212_09					
Below SFNF Boundary*	2001	18.1	24.3/ 17.2	21.0/ 15.9	19.9/ 14.8
Tecolote Creek (I-25 to Blue Creek): NM-2212_10					
At Blue Haven**	2016	18.8	25.1/ 18.9	21.7/ 16.7	20.7/ 16.3
Near San Geronimo	2001	20.1	26.5/ 27.4	23.1/ 24.9	22.0/ 23.9
	2016		26.5/ 26.9	23.1/ 23.7	22.0/ 22.5
@ I-25	2010	21.6	28.1/ 29.6	24.7/ 27.3	23.5/ 26.0
	2016		28.1/ 31.1	24.7/ 26.9	23.5/ 25.5

* the Below SFNF (Santa Fe National Forest) Boundary monitoring station is located 0.7 km above the confluence with Blue Creek
** Blue Haven is not a designated SWQB monitoring station; it is located approximately 2 km downstream from the confluence with Blue Creek
(a) PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, accessed 25 Oct 2016
(b) P/O – Predicted/ Observed

Table 4b. Air-Water Temperature Correlation Model Predicted Temperatures for Tecolote Creek in °C, using average July air temperature adjusted for variation from 30-year normal

Monitoring Station	Year	ATEMP(a)	T_{MAX} (P/O)(b)	4T3 (P/O)(b)	6T3 (P/O)(b)
Tecolote Creek (Blue Creek to headwaters): NM-2212_09					
Below SFNF Boundary*	2001	19.7	26.0/ 17.2	22.7/ 15.9	21.6/ 14.8
Tecolote Creek (I-25 to Blue Creek): NM-2212_10					
Near San Geronimo	2001	21.7	28.2/ 27.4	24.8/ 24.9	23.7/ 23.9
@ I-25	2010	22.4	28.9/ 29.6	25.6/ 27.3	24.4/ 26.0

* the Below SFNF (Santa Fe National Forest) Boundary monitoring station is located 0.7 km above the confluence with Blue Creek
(a) PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, accessed 25 Oct 2016

(b) P/O – Predicted/ Observed

Measured temperatures much warmer than predicted by the model may indicate impairment, while measured temperatures much cooler than predicted may indicate the influence of groundwater, such as seeps and springs. If measured and predicted temperatures are near agreement, the water body is likely achieving its natural air temperature-driven thermal condition. The AWTC model estimates the effect of air temperature on ALU as follows:

- high quality coldwater or coldwater aquatic life uses may be attainable if ATEMP ≤18°C;
- marginal coldwater or coolwater aquatic life uses may be attainable if ATEMP ≤23°C
- warmwater may be the most protective aquatic life use attainable if ATEMP >23°C

For all Tecolote Creek monitoring stations examined in this UAA, ATEMP is between 18°C and 23°C, hence the model predicts that marginal coldwater or coolwater may be the most protective ALU attainable. The marginal coldwater and coolwater aquatic life uses both have T_{MAX} criteria of 29°C, but these uses describe different habitats (see Appendix B). Coolwater describes habitat that is naturally intermediate between cold and warm. Marginal coldwater refers to habitat where natural intermittent or low flows, or other natural habitat conditions, severely limit maintenance of a coldwater aquatic life population, and these conditions are not known to exist in Tecolote Creek. The I-25 monitoring station exceeded the marginal coldwater/coolwater ALU T_{MAX} criterion in both 2010 and 2016. This is likely a water quality impairment. Probable Source sheets completed by staff conducting the 2010 survey identify roads and exotic species as two factors impacting the watershed.

The measured water temperature for the stations in the Tecolote Creek AU upstream of Blue Creek to the headwaters and at the top of the AU Tecolote Creek (I-25 to Blue Creek) were several degrees cooler than the AWTC model predicted, with or without correcting for air temperature departure from normal. This difference could be the result of groundwater input above the monitoring stations. Groundwater inputs sufficient to moderate the influence of ambient air temperature on water temperature may be indicated by reduced diel swings in water temperature. To evaluate this possibility, the thermograph records from downstream of the SFNF Boundary and at Blue Haven were examined for indications of groundwater input. The diel swings at both stations were slightly reduced in amplitude compared to the downstream monitoring site at San Geronimo, but not enough to definitively indicate a groundwater influence. In any case, it is clear that Tecolote Creek upstream of Blue Creek can and does meet its current HQCW ALU standard (Figure 5).

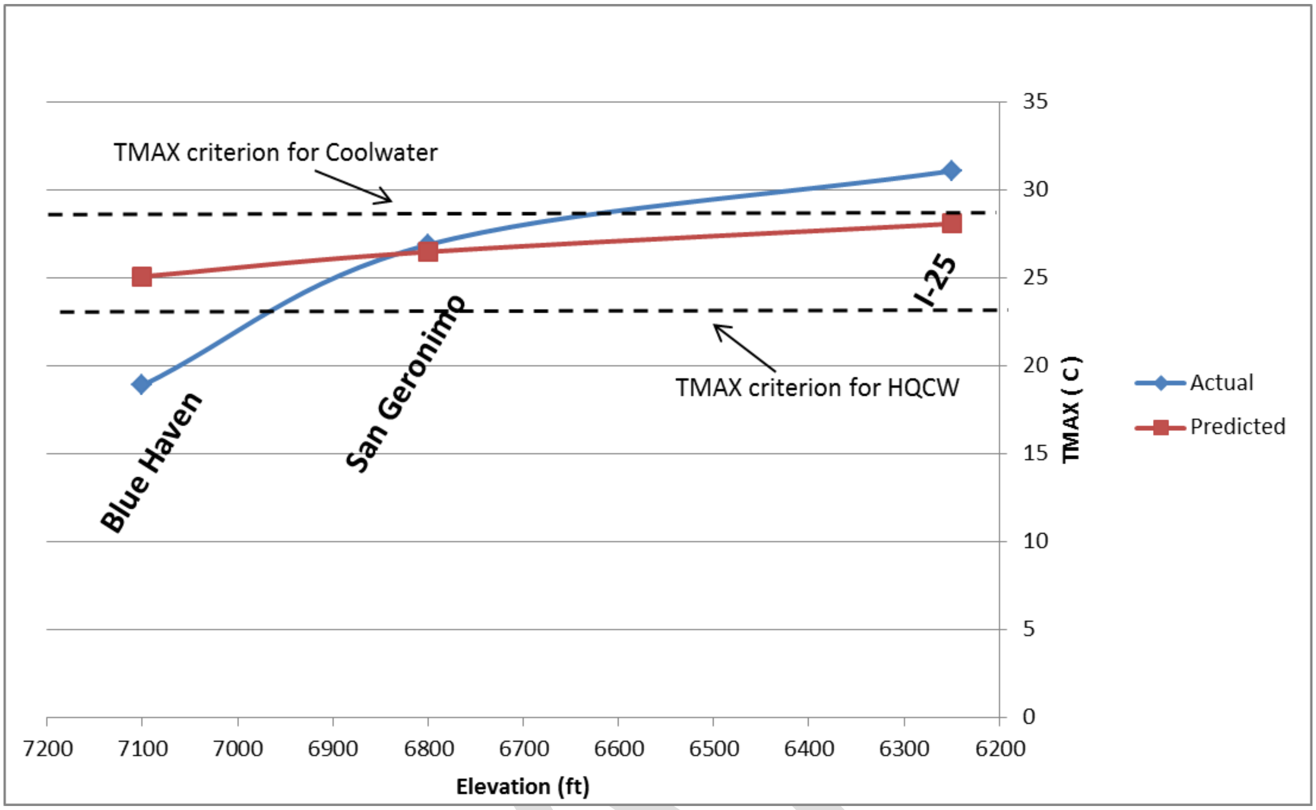


Figure 5. TMAX temperatures along Tecolote Creek, as predicted by the NMED/SWQB Air-Water Temperature Correlation Model (unadjusted), and as measured by thermographs in 2016.

AQUATIC LIFE

New Mexico's aquatic life uses and associated criteria protect the aquatic community, including fish, based on habitat requirements. Fish community data are often used to identify an appropriate aquatic life use based on water temperature. NMED has assigned a generalized thermal preference category of cold, cool, or warm for many fish species in New Mexico based on scientific consensus, review of the available research, and best professional judgment (Morrow and Fischenich, 2000).

Fish species recorded from Tecolote Creek are shown on Table 5. Only coldwater species have been documented at the Tecolote Creek AU between Blue Creek to the headwaters. A few specimens of a coldwater species (brown trout) were found at San Geronimo at the upper portion of the Tecolote Creek AU between I-25 to Blue Creek, and a few specimens of a warmwater species (green sunfish) were found further downstream of the same AU at I-25, but this AU is dominated by coolwater species. Available historic (1939-1975) records indicate that fish species composition has remained relatively stable within the past 80 years. It remains possible that the fish community may have changed in response to anthropogenic factors during the period prior to 1939.

Table 5. Fish species found in Tecolote Creek

Common name	Species name	Number	Year	Water temperature preference	Native?
TECOLOTE CREEK BLW SFNF BOUNDARY (AU NM 2112-09)					
Rainbow trout	*Oncorhynchus mykiss*	8	2001	cold	no
Cutbow trout	*Oncorhynchus clarkii x mykiss*	2	2001	cold	no
Brown trout	*Salmo trutta*	66	2001	cold	no
Brook trout	*Salvelinus fontinalis*	16	2001	cold	no
TECOLOTE CREEK AT BRIDGE NEAR SAN GERONIMO (AU NM 2112-10)					
Brown trout	*Salmo trutta*	17	2001	cold	no
Rio Grande chub	*Gila pandora*	40	2001	cool	yes
Longnose dace	*Rhinichthys cataractae*	231	2001	cool	yes
		P*	1975		
TECOLOTE CREEK AT I-25 NEAR TECOLOTE (AU NM 2112-10)					
Longnose dace	*Rhinichthys cataractae*	TNTC**	2010	cool	yes
		157	2001		
		P*	1975		
		P*	1965		
		P*	1939		
Rio Grande chub	*Gila pandora*	TNTC**	2010	cool	yes
		160	2001		
		P*	1965		
		P*	1939		
Green sunfish	*Lepomis cyanellus*	3	2001	warm	no

* P= Present, not quantified; **TNTC= Too Numerous To Count

CONCLUSION

The high quality coldwater ALU for the AU between I-25 and Blue Creek is not attainable because "naturally occurring pollutant concentrations [thermal energy] prevent the attainment of the use…." (40 CFR 131.10 (g)(1), see Appendix A). Based on the conditions described in this UAA, coolwater is the highest potentially attainable ALU for Tecolote Creek from I-25 to Blue Creek (AU NM-2212_10). The ecoregional setting, ambient air temperatures, and fish community of Tecolote Creek all support this conclusion. Although the monitoring station at I-25 is in an ecoregion classified as Xeric, the AWTC model indicates it could attain a coolwater T_{MAX}. Water temperature appears to change rapidly somewhere between Blue Haven and San Geronimo, without an identifiable intervening coldwater reach.

In order to change the designation for Tecolote Creek upstream of I-25 to Blue Creek (AU NM 2212-10), from a HQCW ALU to a coolwater ALU, it will be necessary to create a new segment in the State's Water Quality Standards. NMED recommends that 20.6.4.215 NMAC be amended as follows, to exclude Tecolote Creek:

20.6.4.215 PECOS RIVER BASIN - Perennial reaches of the Gallinas river and all its tributaries upstream of **the diversion for the Las Vegas municipal reservoir and perennial reaches of Tecolote creek and its perennial tributaries** upstream of Blue Creek.

A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat, industrial water supply and primary contact; and public water supply on the Gallinas river.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 300 µS/cm or less (450 µS/cm or less in Wright Canyon creek); the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

To implement the ALU change in AU NM-2212_10, Tecolote Creek (I-25 to Blue Creek), it will be necessary to add a new water quality standards segment. NMED recommends the following water quality Segment be added to the standards:

20.6.4.230 PECOS RIVER BASIN - Tecolote Creek from I-25 to Blue Creek.

A. Designated Uses: domestic water supply, coolwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

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APPENDIX A

40 CFR 131.10(g):

(g) States may remove a designated use which is not an existing use, as defined in Sec. 131.3, or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

APPENDIX B

DEFINITIONS 20.6.4.7 NMAC:

C.
(4) "Coldwater" in reference to an aquatic life use means a surface water of the state where the water temperature and other characteristics are suitable for the support or propagation or both of coldwater aquatic life.

(5) "Coolwater" in reference to an aquatic life use means the water temperature and other characteristics are suitable for the support or propagation of aquatic life whose physiological tolerances are intermediate between and may overlap those of warm and coldwater aquatic life.

H.
(1) "High quality coldwater" in reference to an aquatic life use means a perennial surface water of the state in a minimally disturbed condition with considerable aesthetic value and superior coldwater aquatic life habitat. A surface water of the state to be so categorized must have water quality, stream bed characteristics and other attributes of habitat sufficient to protect and maintain a propagating coldwater aquatic life population.

L.
(2) "Limited aquatic life" as a designated use, means the surface water is capable of supporting only a limited community of aquatic life. This subcategory includes surface waters that support aquatic species selectively adapted to take advantage of naturally occurring rapid environmental changes, ephemeral or intermittent water, high turbidity, fluctuating temperature, low dissolved oxygen content or unique chemical characteristics.

M.
(1) "Marginal coldwater" in reference to an aquatic life use means that natural intermittent or low flows, or other natural habitat conditions severely limit maintenance of a coldwater aquatic life population or historical data indicate that the temperature in the surface water of the state may exceed 25°C (77°F).

(2) "Marginal warmwater" in reference to an aquatic life use means natural intermittent or low flow or other natural habitat conditions severely limit the ability of the surface water of the state to sustain a natural aquatic life population on a continuous annual basis; or historical data indicate that natural water temperature routinely exceeds 32.2°C (90°F).

W.
(1) "Warmwater" with reference to an aquatic life use means that water temperature and other characteristics are suitable for the support or propagation or both of warmwater aquatic life.