
EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop Total Maximum Daily Load (TMDL) management plans for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint source and background conditions. TMDLs also include a Margin of Safety (MOS).

The Surface Water Quality Bureau (SWQB) conducted a water quality survey of the Cimarron Basin of northeastern New Mexico in 2006. Water quality monitoring stations were located within the Cimarron Watershed to evaluate the impact of tributary streams and ambient water quality conditions. As a result of assessing data generated during this monitoring effort, impairment determinations of New Mexico water quality standards include the following:

- DISSOLVED ARSENIC in Cimarron River (Cimarron Village to Turkey Creek), Cimarron River (Turkey Creek to Eagle Nest Lake), and Ute Creek (Cimarron River to headwaters);
- BACTERIA (*E. coli*) in Cieneguilla Creek (Eagle Nest Lake to headwaters), North Ponil Creek (South Ponil Creek to Seally Canyon), Ponil Creek (US 64 to confluence of North and South Ponil), Ponil Creek (Cimarron River to US 64), Rayado Creek (Miami Lake diversion to headwaters), Sixmile Creek (Eagle Nest Lake to headwaters), and Ute Creek (Cimarron River to headwaters);
- PLANT NUTRIENTS in Cieneguilla Creek (Eagle Nest Lake to headwaters), Cimarron River (Canadian River to Cimarron Village), Cimarron River (Turkey Creek to Eagle Nest Lake), Moreno Creek (Eagle Nest Lake to headwaters), Ponil Creek (US 64 to confluence of North and South Ponil Creeks), Rayado Creek (Cimarron River to Miami Lake diversion), and Sixmile Creek (Eagle Nest Lake to headwaters); and
- TEMPERATURE in Cieneguilla Creek (Eagle Nest Lake to headwaters), Cimarron River (Cimarron Village to Turkey Creek), Moreno Creek (Eagle Nest Lake to headwaters), Rayado Creek (Miami Lake diversion to headwaters), Sixmile Creek (Eagle Nest Lake to headwaters), South Ponil Creek (Ponil Creek to Middle Ponil), and Ute Creek (Cimarron River to headwaters).

SWQB data collections documented continued impairments of the New Mexico WQS. These are "old" impairment listings that already resulted in a TMDL but continue to be impaired based on the 2006 data and assessments include:

- TURBIDITY on Cieneguilla Creek (Eagle Nest Lake to headwaters), North Ponil Creek (South Ponil Creek to Seally Canyon), Ponil Creek (US 64 to confluence of North and South Ponil Creeks), and Sixmile Creek (Eagle Nest Lake to headwaters);
- TEMPERATURE on Middle Ponil Creek (South Ponil Creek to Greenwood Creek), North Ponil Creek (South Ponil Creek to Seally Canyon), and Ponil Creek (US 64 to confluence of North and South Ponil Creeks); and
- SEDIMENTATION/SILTATION on Cieneguilla Creek (Eagle Nest Lake to headwaters) and Rayado Creek (Cimarron River to Miami Lake diversion).

As a result of assessing data generated during this monitoring effort, SWQB staff also documented improvements in water quality which resulted in several impairments being removed from the 2010-2012 CWA §303(d) List of Assessed Waterbodies. These “delisted” waters include:

- ALUMINUM on Cieneguilla Creek (Eagle Nest Lake to headwaters), Cimarron River (Canadian River to Cimarron Village), Cimarron River (Cimarron Village to Turkey Creek), Ponil Creek (Cimarron River to US 64), and Ponil Creek (US 64 to confluence of North and South Ponil Creeks);
- BACTERIA (Fecal Coliform) on Cieneguilla Creek (Eagle Nest Lake to headwaters) and Moreno Creek (Eagle Nest Lake to headwaters);
- SEDIMENTATION/SILTATION on Middle Ponil Creek (South Ponil Creek to Greenwood Creek), North Ponil Creek (South Ponil Creek to Seally Canyon), Ponil Creek (Cimarron River to US 64), and Ponil Creek (US 64 to confluence of North and South Ponil Creeks);
- TEMPERATURE on Ponil Creek (Cimarron River to US 64); and
- TURBIDITY on Middle Ponil Creek (South Ponil Creek to Greenwood Creek), Moreno Creek (Eagle Nest Lake to headwaters), and Ponil Creek (Cimarron River to US 64).

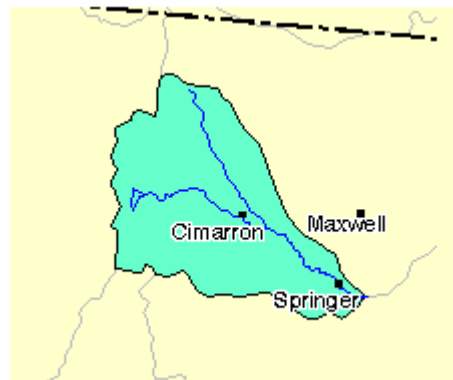
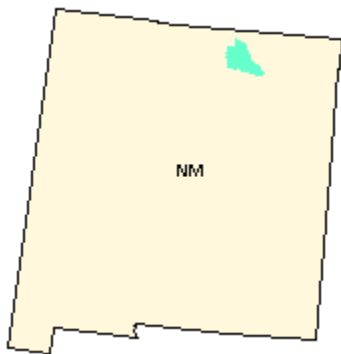
Waters removed from the 303(d) list do not require development of a TMDL.

This TMDL document addresses the above noted impairments as summarized in the tables below. The data used to develop this TMDL were collected during the 2006 Cimarron Watershed survey with follow-up collections in 2007, 2008, and 2009. The 2006 study identified other potential water quality impairments which are not addressed in this document. Additional data needs for verification of those impairments are being identified and data collection will follow. If these impairments are verified, subsequent TMDLs will be prepared in a separate TMDL document.

The SWQB’s Monitoring and Assessment Section will collect water quality data during the next rotational cycle. The next scheduled monitoring date for the Cimarron Watershed is 2016 at which time TMDL targets will be re-examined and potentially revised as this document is considered to be an evolving management plan. In the event that new data indicate that the targets used in this analysis are not appropriate and/or if new standards are adopted, the load capacity will be adjusted accordingly. When water quality standards have been achieved, the reach will be moved to the appropriate category in the Integrated Report.

The SWQB’s Watershed Protection Section will continue to work with watershed groups to develop Watershed-Based Plans to implement strategies that attempt to correct the water quality impairments detailed in this document. Implementation of items detailed in the Watershed-Based Plans will be done with participation of all interested and affected parties.

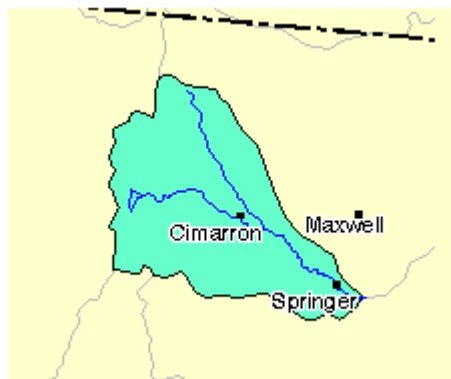
**TOTAL MAXIMUM DAILY LOAD FOR
CIENEGUILLA CREEK (EAGLE NEST LAKE TO HEADWATERS)**



New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_065 formerly known as NM-CR2-50000
Segment Length	12.63 miles
Parameters of Concern	<i>E. coli</i> , Temperature, Plant Nutrients
Uses Affected	Secondary Contact; High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	56 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Loss of riparian habitat; municipal point source dischargers, other recreational pollution sources, rangeland grazing, streambank modification/destabilization
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for:	WLA + LA + MOS = TMDL
<i>E. coli</i>	$2.39 \times 10^9 + 6.21 \times 10^8 + 3.34 \times 10^8 = 3.34 \times 10^9$ cfu/day
Temperature	0* + 131.79 + 14.64 = 146.43 j/m²/s/day
Plant Nutrients:	
Total Phosphorus	0.25 + 0.065 + 0.035 = 0.35 lbs/day
Total Nitrogen	2.3 + 0.67 + 0.33 = 3.3 lbs/day

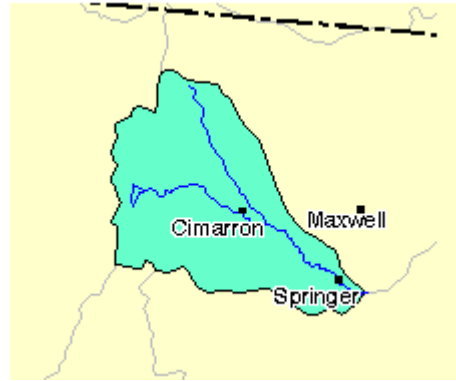
* See discussion in Section 6.4.1.

**TOTAL MAXIMUM DAILY LOAD FOR
CIMARRON RIVER (CANADIAN RIVER TO CIMARRON VILLAGE)**



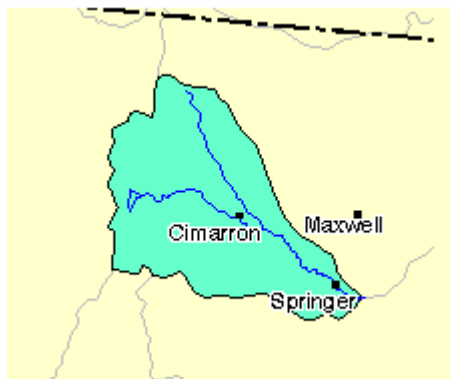
New Mexico Standards Segment	20.6.4.306
Waterbody Identifier	NM-2305.1.A_10 formerly known as NM-CR2-10000
Segment Length	37.79 miles
Parameters of Concern	Plant Nutrients
Uses Affected	Warmwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	1,032 square miles
Land Type	Southwest Tablelands (Ecoregion 26)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Flow alterations from water diversions, impervious surface/ parking lot runoff, on-site treatment systems (septic systems and similar decentralized systems), rangeland grazing
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for:	
Plant Nutrients:	WLA + LA + MOS = TMDL
Total Phosphorus	0.075 + 0.049 + 0.014 = 0.14 lbs/day
Total Nitrogen	1.1 + 0.75 + 0.21 = 2.1 lbs/day

**TOTAL MAXIMUM DAILY LOAD FOR
CIMARRON RIVER (CIMARRON VILLAGE TO TURKEY CREEK)**



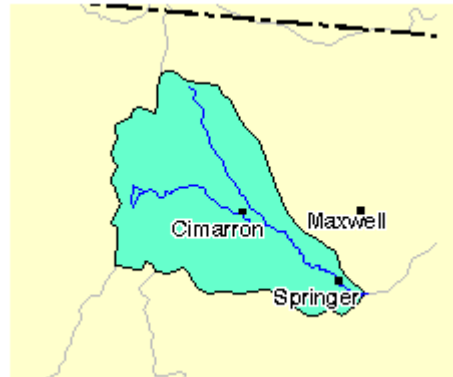
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_040 formerly known as NM-CR2-10000
Segment Length	4.25 miles
Parameters of Concern	Arsenic, Temperature
Uses Affected	Domestic Water Supply, High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	294 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Baseflow depletion from groundwater withdrawals, loss of riparian habitat, rangeland grazing, source unknown
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5
TMDL for:	WLA + LA + MOS = TMDL
Arsenic	0 + 0.236 + 0.059 = 0.295 lbs/day
Temperature	0 + 104.70 + 11.63 = 116.33 j/m²/s/day

**TOTAL MAXIMUM DAILY LOAD FOR
CIMARRON RIVER (TURKEY CREEK TO EAGLE NEST LAKE)**



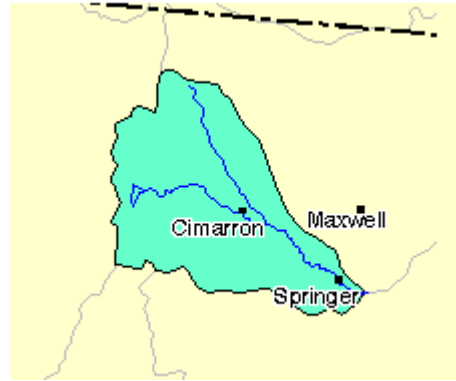
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_130 formerly known as NM-CR2-20000
Segment Length	18.19 miles
Parameters of Concern	Arsenic, Plant Nutrients
Uses Affected	Domestic Water Supply, High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	265 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Dam or impoundment, on-site treatment systems (septic systems and similar decentralized systems), other recreational pollution sources, source unknown, wildlife other than waterfowl
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for:	WLA + LA + MOS = TMDL
Arsenic	0 + 0.150 + 0.040 = 0.190 lbs/day
Plant Nutrients:	
Total Phosphorus	0 + 0.198 + 0.022 = 0.22 lbs/day
Total Nitrogen	0 + 2.52 + 0.28 = 2.8 lbs/day

**TOTAL MAXIMUM DAILY LOAD FOR
MORENO CREEK (EAGLE NEST LAKE TO HEADWATERS)**



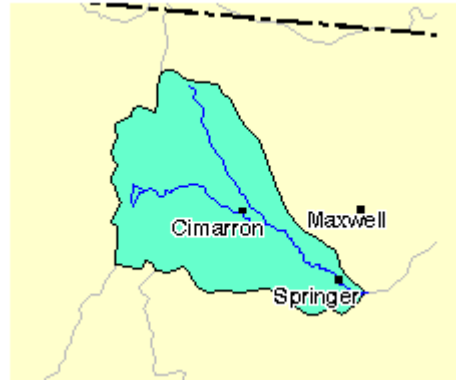
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_060 formerly known as NM-CR2-30000
Segment Length	9 miles
Parameters of Concern	Temperature, Plant Nutrients
Uses Affected	High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	73.8 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	On-site treatment systems (septic systems and similar decentralized systems), rangeland grazing, wastes from pets
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for:	WLA + LA + MOS = TMDL
Temperature	0 + 97.35 + 10.82 = 108.16 j/m²/s/day
Plant Nutrients:	
Total Phosphorus	0 + 0.018 + 0.002 = 0.02 lbs/day
Total Nitrogen	0 + 0.225 + 0.025 = 0.25 lbs/day

**TOTAL MAXIMUM DAILY LOAD FOR
NORTH PONIL CREEK (SOUTH PONIL CREEK TO SEALLY CANYON)**



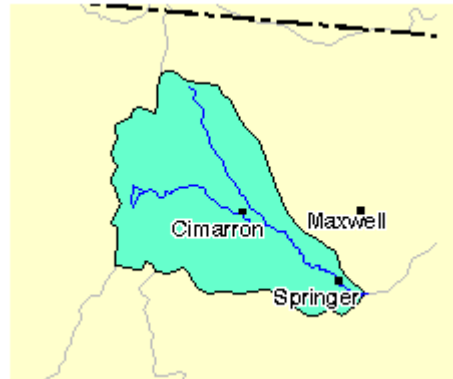
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_110 formerly known as NM-CR2-10400
Segment Length	14.78 miles
Parameters of Concern	<i>E. coli</i>
Uses Affected	Secondary Contact
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	85 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Forest roads (road construction and use), habitat modification – other than hydromodification, loss of riparian habitat, low water crossing, rangeland grazing, silviculture harvesting
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for: <i>E. coli</i>	$\mathbf{WLA + LA + MOS = TMDL}$ $\mathbf{0 + 6.45 \times 10^8 + 7.16 \times 10^7 = 7.16 \times 10^8 \text{ cfu/day}}$

**TOTAL MAXIMUM DAILY LOAD FOR
PONIL CREEK (CIMARRON RIVER TO US 64)**



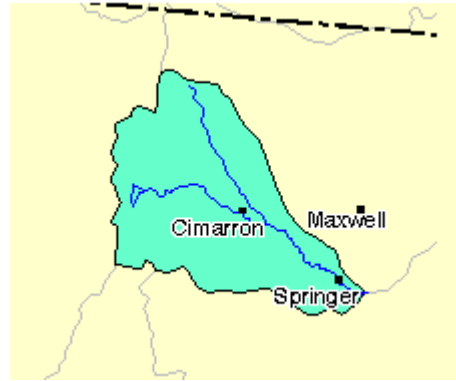
New Mexico Standards Segment	20.6.4.306
Waterbody Identifier	NM-2306.A_100 formerly known as NM-CR2-10300
Segment Length	9.9 miles
Parameters of Concern	<i>E. coli</i>
Uses Affected	Secondary Contact
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	331 square miles
Land Type	Southwestern Tablelands (Ecoregion 26)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Avian sources (waterfowl and/or other), on-site treatment systems (septic systems and similar decentralized systems), source unknown, wastes from pets
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for: <i>E. coli</i>	$\mathbf{WLA + LA + MOS = TMDL}$ $3.96 \times 10^7 + 1.93 \times 10^9 + 2.19 \times 10^8 = 2.19 \times 10^9 \text{ cfu/day}$

**TOTAL MAXIMUM DAILY LOAD FOR
PONIL CREEK (US 64 TO CONFL OF NORTH & SOUTH PONIL)**



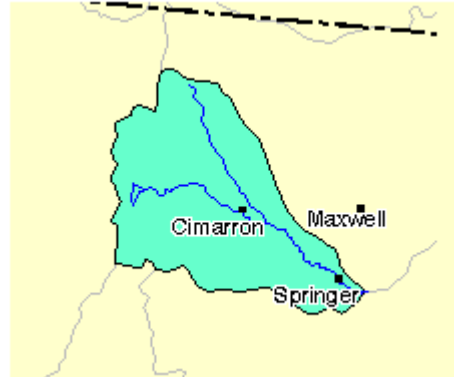
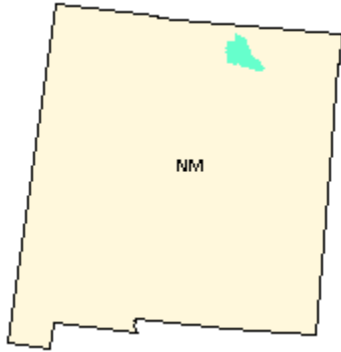
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_101 formerly known as NM-CR2-10300
Segment Length	7 miles
Parameters of Concern	<i>E. coli</i> , Plant Nutrients
Uses Affected	Secondary Contact; High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	233 square miles
Land Type	Southern Rockies (Ecoregion 21); Southwestern Tablelands (Ecoregion 26)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Livestock (grazing or feeding operations), loss of riparian habitat, on-site treatment systems (septic systems and similar decentralized systems), rangeland grazing, wastes from pets, streambank modification/destabilization
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for:	WLA + LA + MOS = TMDL
<i>E. coli</i>	0 + 9.03x10⁸ + 1.00x10⁸ = 1.00x10⁹ cfu/day
Plant Nutrients:	
Total Phosphorus	0 + 0.036 + 0.004 = 0.04 lbs/day
Total Nitrogen	0 + 0.396 + 0.044 = 0.44 lbs/day

**TOTAL MAXIMUM DAILY LOAD FOR
RAYADO CREEK (CIMARRON RIVER TO MIAMI LAKE DIVERSION)**



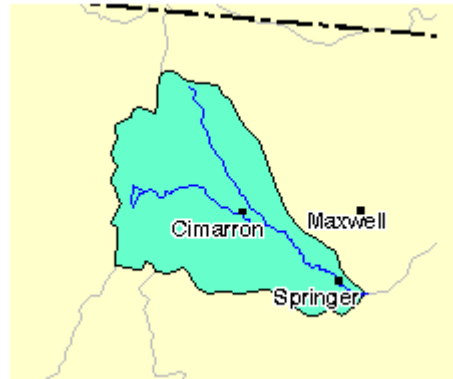
New Mexico Standards Segment	20.6.4.307
Waterbody Identifier	NM-2305.3.A_80 formerly known as NM-CR2-10100
Segment Length	14.24 miles
Parameters of Concern	Plant Nutrients
Uses Affected	Marginal Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	202 square miles
Land Type	Southwestern Tablelands (Ecoregion 26)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Dam or impoundment, habitat modification – other than hydromodification, highway/road/bridge runoff (non-construction related), loss of riparian habitat, rangeland grazing
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5
TMDL for:	
Plant Nutrients:	WLA + LA + MOS = TMDL
Total Phosphorus	0 + 0.063 + 0.007 = 0.07 lbs/day
Total Nitrogen	0 + 0.918 + 0.102 = 1.02 lbs/day

**TOTAL MAXIMUM DAILY LOAD FOR
RAYADO CREEK (MIAMI LAKE DIVERSION TO HEADWATERS)**



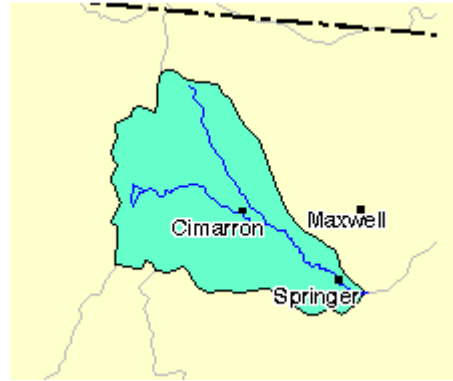
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_051 formerly known as NM-CR2-10200
Segment Length	24.26 miles
Parameters of Concern	<i>E. coli</i> , Temperature
Uses Affected	Secondary Contact, High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	59 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Baseflow depletions from groundwater withdrawals, on-site treatment systems (septic systems and similar decentralized systems), rangeland grazing, wildlife other than waterfowl
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for:	WLA + LA + MOS = TMDL
<i>E. coli</i>	0 + 5.24x10⁹ + 5.83x10⁸ = 5.83x10⁹ cfu/day
Temperature	0 + 143.96 + 16.00 = 159.96 j/m²/s/day

**TOTAL MAXIMUM DAILY LOAD FOR
SIXMILE CREEK (EAGLE NEST LAKE TO HEADWATERS)**



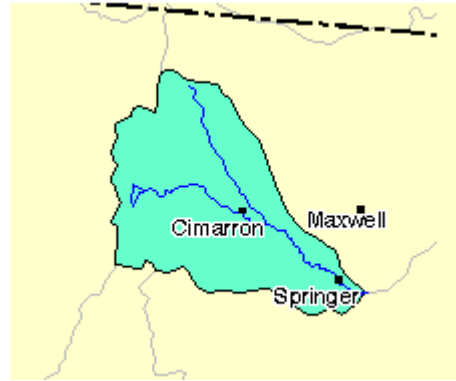
New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_064 (no previous waterbody identifier)
Segment Length	4.6 miles
Parameters of Concern	<i>E. coli</i> , Temperature, Plant Nutrients
Uses Affected	Secondary Contact, High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	10.5 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Animal feeding operations (NPS), habitat modification – other than hydromodification, livestock (grazing or feeding operations), natural sources, on-site treatment systems (septic systems and other similar decentralized systems), rangeland grazing, wildlife other than waterfowl
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5
TMDL for:	WLA + LA + MOS = TMDL
<i>E. coli</i>	0 + 4.73x10⁸ + 5.25x10⁷ = 5.25x10⁸ cfu/day
Temperature	0 + 171.46 + 19.05 = 190.51 j/m²/s/day
Plant Nutrients:	
Total Phosphorus	0 + 0.027 + 0.003 = 0.03 lbs/day
Total Nitrogen	0 + 0.279 + 0.031 = 0.31 lbs/day

**TOTAL MAXIMUM DAILY LOAD FOR
SOUTH PONIL CREEK (PONIL CREEK TO MIDDLE PONIL)**



New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_120 formerly known as NM-CR2-10600
Segment Length	5.23 miles
Parameters of Concern	Temperature
Uses Affected	High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	94.8 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Rangeland grazing
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5A
TMDL for: Temperature	$\text{WLA} + \text{LA} + \text{MOS} = \text{TMDL}$ $0 + 143.09 + 15.90 = 158.99 \text{ j/m}^2/\text{s/day}$

**TOTAL MAXIMUM DAILY LOAD FOR
UTE CREEK (CIMARRON RIVER TO HEADWATERS)**



New Mexico Standards Segment	20.6.4.309
Waterbody Identifier	NM-2306.A_068 formerly known as NM-CR2-Ute
Segment Length	8.04 miles
Parameters of Concern	Arsenic, <i>E. coli</i> , Temperature
Uses Affected	Domestic Water Supply, Secondary Contact, High Quality Coldwater Aquatic Life
Geographic Location	Cimarron USGS Hydrologic Unit Code 11080002
Scope/size of Watershed	15.8 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	51% Forest; 47% Rangeland; 2% Agriculture; <1% Urban
Probable Sources	Loss of riparian habitat, on-site treatment systems (septic systems and similar decentralized systems), rangeland grazing, source unknown
Land Management	84% Private; 9% Forest Service; 7% State; <1% Native Lands
IR Category	5
TMDL for:	WLA + LA + MOS = TMDL
Arsenic	0 + 0.004 + 0.001 = 0.005 lbs/day
<i>E. coli</i>	0 + 2.02x10⁹ + 2.24x10⁸ = 2.24x10⁹ cfu/day
Temperature	0 + 177.99 + 19.78 = 197.77 j/m²/s/day