



Stormwater Quality Monitoring under a Watershed-based Permit Middle Rio Grande, New Mexico

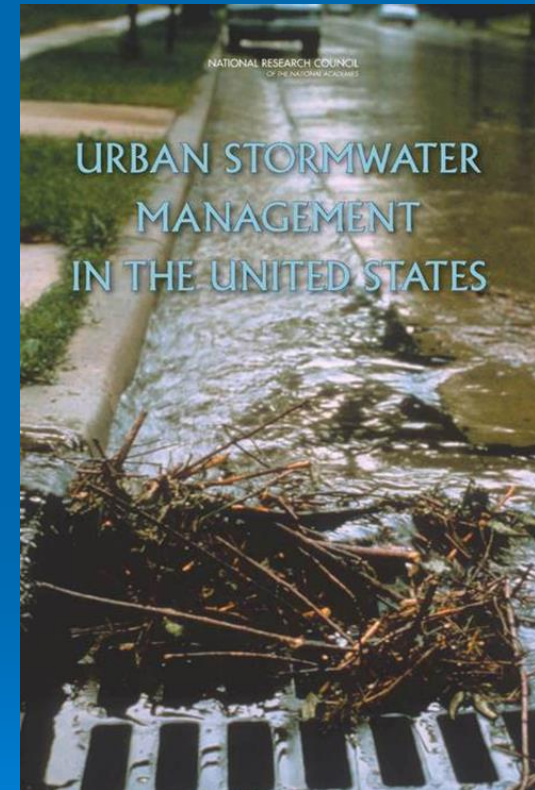


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Middle Rio Grande Watershed-based MS4 Permit

- ◆ National Academy of Sciences/National Research Council commissioned by USEPA in 2006
- ◆ *Urban Stormwater Management in the United States* issued in 2009; problems cited in the report:
 - ◆ Information on BMP longevity and performance
 - ◆ Varying requirements on monitoring
 - ◆ Lack of resources
 - ◆ Land use/water quality functions decoupled
 - ◆ Financial support





Middle Rio Grande Watershed-based MS4 Permit

What is a watershed-based permit?

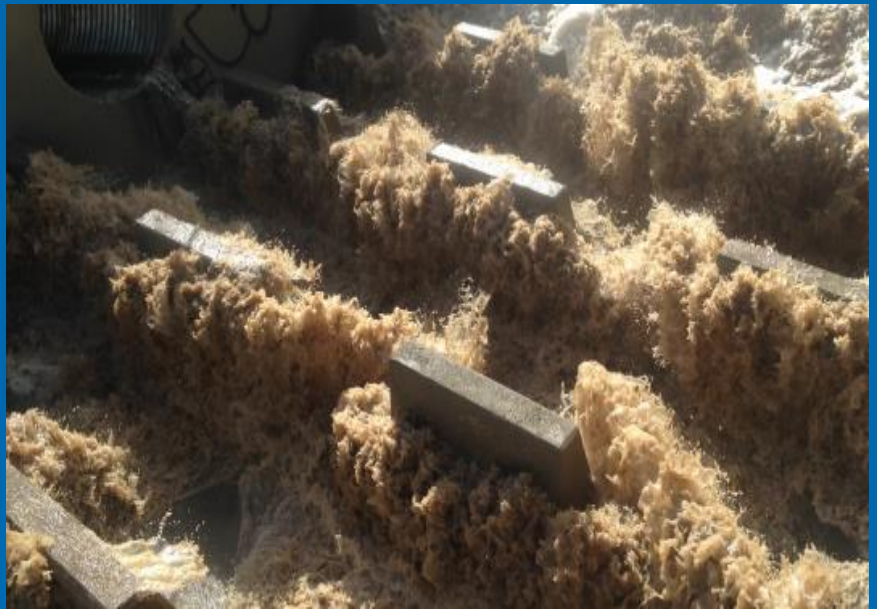
- ◆ A pilot program from EPA-HQ designating a watershed (urbanized area) boundary as the permit boundary, as opposed to a political jurisdiction

Why watershed-based permitting?

- ◆ Addresses all stressors within the hydrologically-defined drainage basin (watershed)
- ◆ More environmentally effective results
- ◆ Allows cooperation between separate political jurisdictions/entities to reduce compliance costs and/or provide efficiencies in permit compliance activities

Middle Rio Grande Watershed-based MS4 Permit

- ◆ New Mexico is one of four states that does not have primacy of the NPDES program.
- ◆ USEPA Region 6 issues all NPDES permits and conducts all NPDES-related enforcement in New Mexico.
- ◆ The New Mexico watershed-based permit for the Middle Rio Grande MS4s (NMR04A000) was issued in December 2014.





Watershed-based Permitting Pilot Projects

- ◆ In 2010, USEPA Headquarters designated:
 - ◆ Ramsey Washington Watershed District, Minnesota
1 entity, established in 1975 under the Minnesota Watershed District Act
 - ◆ Milwaukee Metro Watershed, Wisconsin
1 entity, created in 1982 by the Wisconsin legislature
 - ◆ Middle Rio Grande, New Mexico
18 entities, no oversight governmental body
- ◆ Draft small system MS4 permit for New Mexico was published in 2015



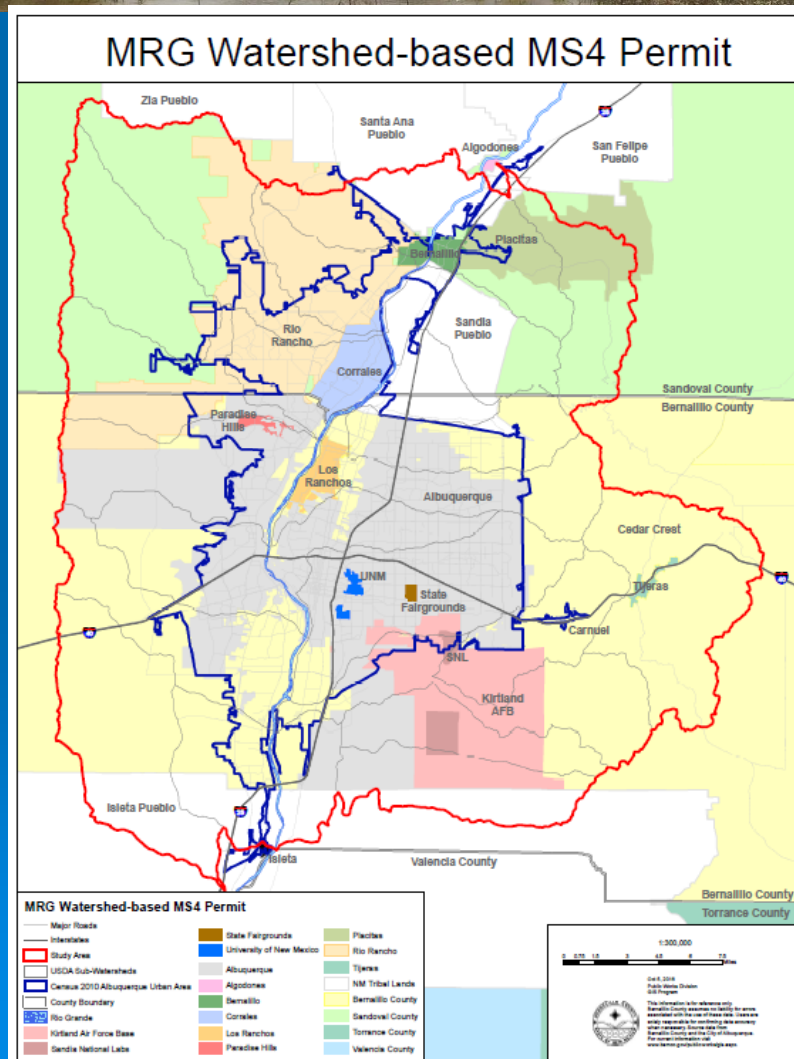
Middle Rio Grande Watershed-based MS4 Permit

Cooperation / Co-permittees

- ◆ Cities/towns/villages, counties, and flood control authorities/NMDOT occupy same geographical area.
- ◆ Eligible entities under this Permit:

Class A Permittees:	Class B Permittees:	Class C Permittees:
<ul style="list-style-type: none">• City of Albuquerque• Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)• University of New Mexico (UNM)• New Mexico Department of Transportation (NMDOT), District 3	<ul style="list-style-type: none">• Bernalillo County• Sandoval County• Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)• City of Rio Rancho• Village of Corrales• Los Ranchos de Albuquerque• Kirtland Air Force Base (KAFB)• Town of Bernalillo• State Fair Grounds/Expo	<ul style="list-style-type: none">• Eastern Sandoval County Arroyo Flood Control Authority• Sandia Labs and the Department of Energy (DOE)

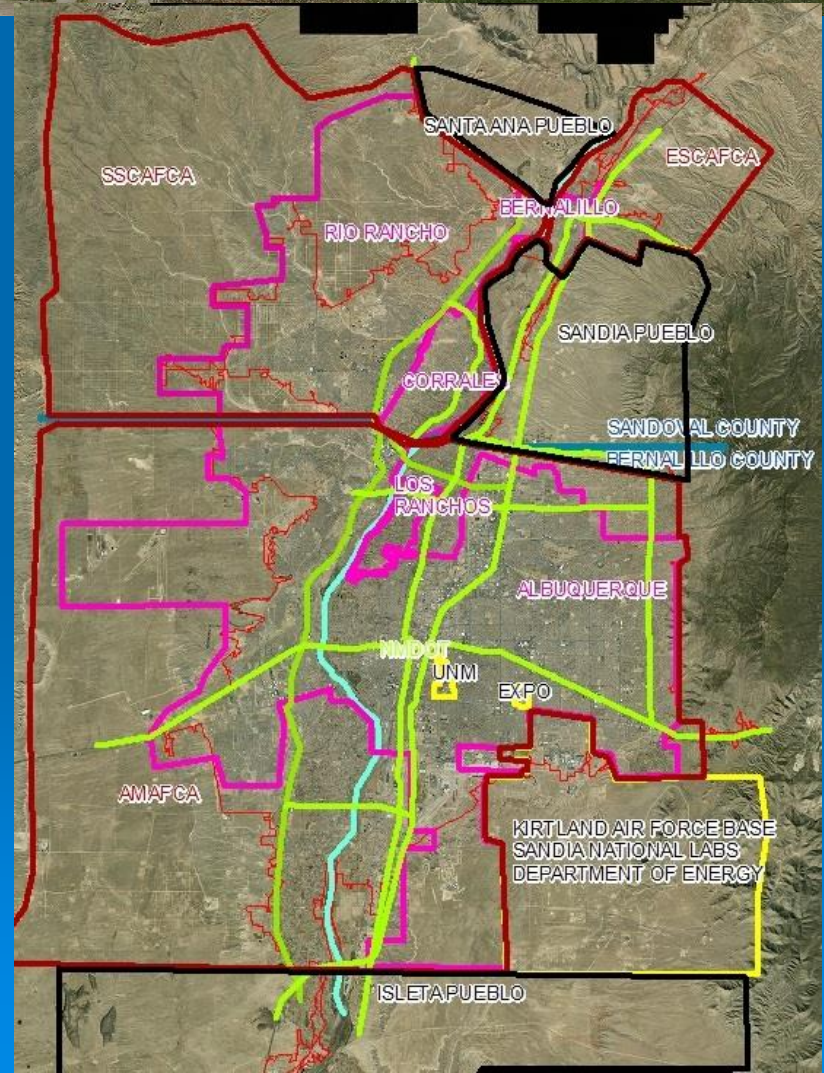
Middle Rio Grande Watershed-based MS4 Permit



Middle Rio Grande Watershed-based MS4 Permit

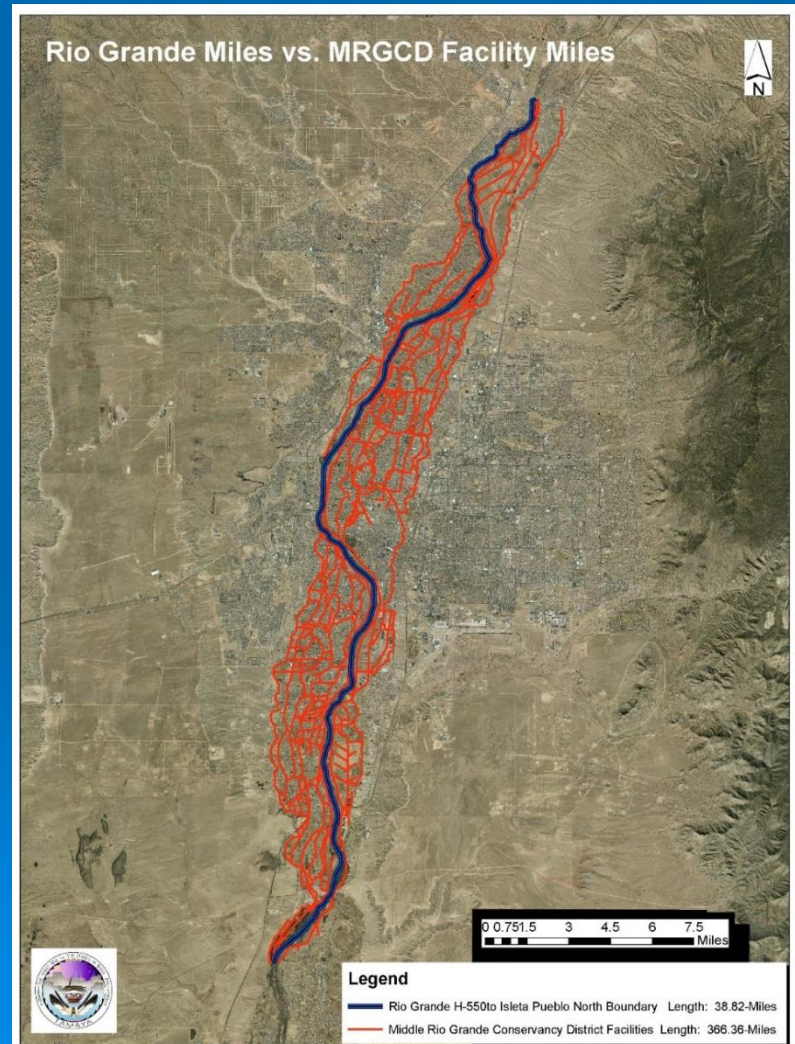
Overlapping jurisdictional boundaries

- ◆ 2 counties
- ◆ 1 town
- ◆ 2 villages
- ◆ 2 cities
- ◆ 3 flood agencies
- ◆ 1 university
- ◆ 1 AFB/DOD
- ◆ 1 National Lab/DOE
- ◆ 1 Fair Grounds/State
- ◆ 1 NM DOT
- ◆ 3 Pueblos



Middle Rio Grande Watershed-based MS4 Permit

- ◆ The watershed has one perennial water body, the Rio Grande
- ◆ Additionally, there is a complex network of drains, ditches, and laterals through the MRG Conservation District (Agricultural)



MRG MS4 Permit

Wet Weather Monitoring

- ◆ The Permit allows a cooperative approach to wet weather monitoring



- ◆ Objective of monitoring approach is to assess the impact of the watershed on the river, not necessarily each entity's impact
- ◆ If there is a water quality exceedance permittees must track down the source



Middle Rio Grande Watershed-Based Permit

- ◆ Technical Advisory Group (TAG) - Exchange of information between entities
 - ◆ An agreement where the participating entities cooperate and exchange information
 - ◆ Complexity
 - ◆ No money could be required
 - ◆ Needed to be a non-binding obligation
 - ◆ Allows entities to be part of the group and exchange information
 - ◆ Fourteen signatories to the TAG.
 - ◆ All levels of government represented (except Tribal).
 - ◆ TAG started meeting in early 2014 and have met monthly or bi-monthly since the permit was issued.

MRG MS4 Permit

Wet Weather Monitoring

- ◆ Members of the TAG formed a cooperative working group, the Compliance Monitoring Cooperative (CMC), to develop a stormwater quality monitoring plan.
 - ◆ 12 MS4s are currently cooperating on wet weather monitoring.
 - ◆ The CMC worked with NMED and EPA to develop the wet weather monitoring plan.

Class A Permittees:	Class B Permittees:	Class C Permittees:
<ul style="list-style-type: none">• City of Albuquerque• Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)• University of New Mexico (UNM)• New Mexico Department of Transportation (NMDOT), District 3	<ul style="list-style-type: none">• Bernalillo County• Sandoval County• Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)• City of Rio Rancho• Village of Corrales• Los Ranchos de Albuquerque• Kirtland Air Force Base (KAFB)• Town of Bernalillo• State Fair Grounds/Expo	<ul style="list-style-type: none">• Eastern Sandoval County Arroyo Flood Control Authority• Sandia Labs and the Department of Energy (DOE)

MRG MS4 Permit Wet Weather Monitoring

Participant	Population Served (tax base)	Population Jurisdictional (within r/w)	Area Served (sq. mi.)	Area Jurisdictional (sq. mi.)
City of Albuquerque	556,495	556,495	189.5	189.5
AMAFCA	639,184	25,000	244.1	3.5
UNM	639,184	9,300	244.1	1.25
NMDOT	58,333	58,333	10	10
Bernalillo County	639,184	76,665	244.1	50.25
Sandoval County	114,153	7,019	287	98
Village of Corrales	8,329	8,329	10.53	10.53
City of Rio Rancho	87,521	87,521	103.7	103.7
Los Ranchos de Albuquerque	6,024	6,024	4.35	4.35
Town of Bernalillo	8,338	8,338	5.23	5.23
ESCAFCA	8,350	100	10	
SSCAFCA	101,103	5,000	49.21	

How do you address cost allocation for cooperative monitoring?

Number	Participant			ENTITY PAYMENT
			\$ 132,000.00	
1	City of Albuquerque	1.38	\$ 45,574.50	\$45,600.00
2	AMAFCA	0.43	\$ 14,319.39	\$14,400.00
3	UNM	0.41	\$ 13,553.53	\$13,600.00
4	NMDOT	0.12	\$ 3,865.56	\$3,900.00
5	Bernalillo County	0.59	\$ 19,549.95	\$19,600.00
6	Sandoval County	0.46	\$ 15,094.20	\$15,100.00
7	Village of Corrales	0.04	\$ 1,393.20	\$1,400.00
8	City of Rio Rancho	0.42	\$ 13,997.46	\$14,000.00
9	Los Ranchos de Albuquerque	0.02	\$ 705.79	\$1,000.00
10	Town of Bernalillo	0.03	\$ 903.81	\$1,000.00
11	ESCAFCA	0.01	\$ 338.88	\$500.00
12	SSCAFCA	0.08	\$ 2,703.72	\$2,900.00
	Ratio Check (Sum = Weighting Factor)	4.00		\$132,000.00

MRG MS4 Permit

Wet Weather Monitoring



- ◆ Stormwater quality samples are collected in-stream, not from outfalls

MRG MS4 Permit

Wet Weather Monitoring

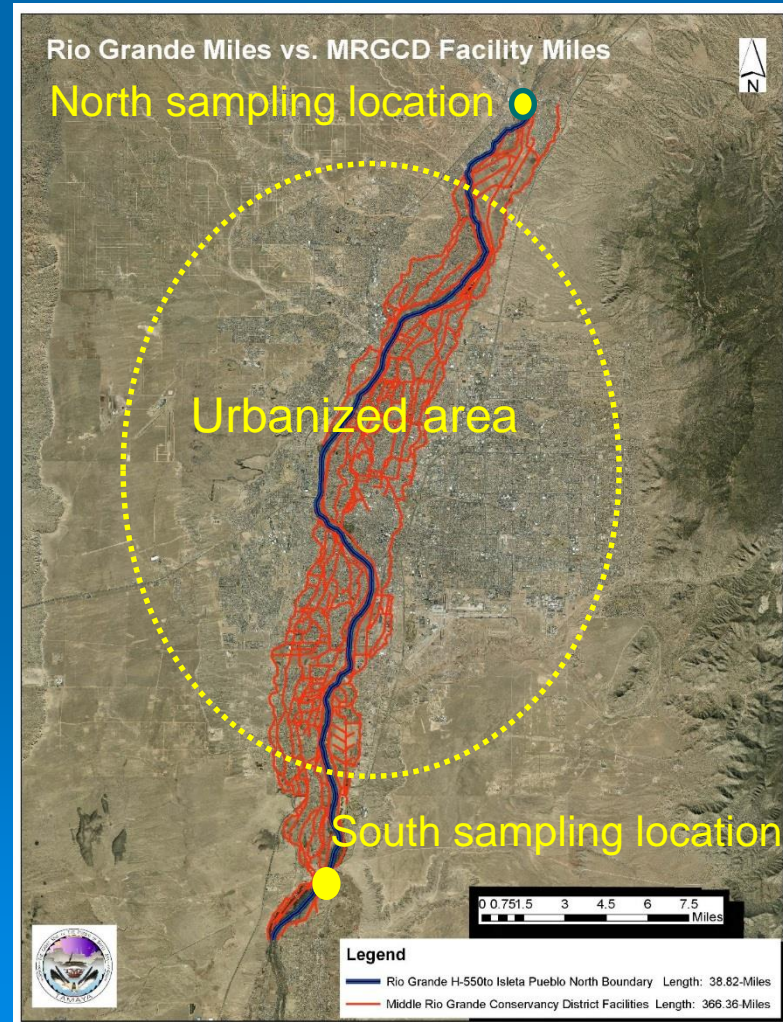
- ◆ Middle Rio Grande Conservancy District
 - ◆ Several entities, through agreements with the MRGCD, discharge stormwater into the agricultural drains
 - ◆ How do we monitor stormwater in these drains?



MRG MS4 Permit

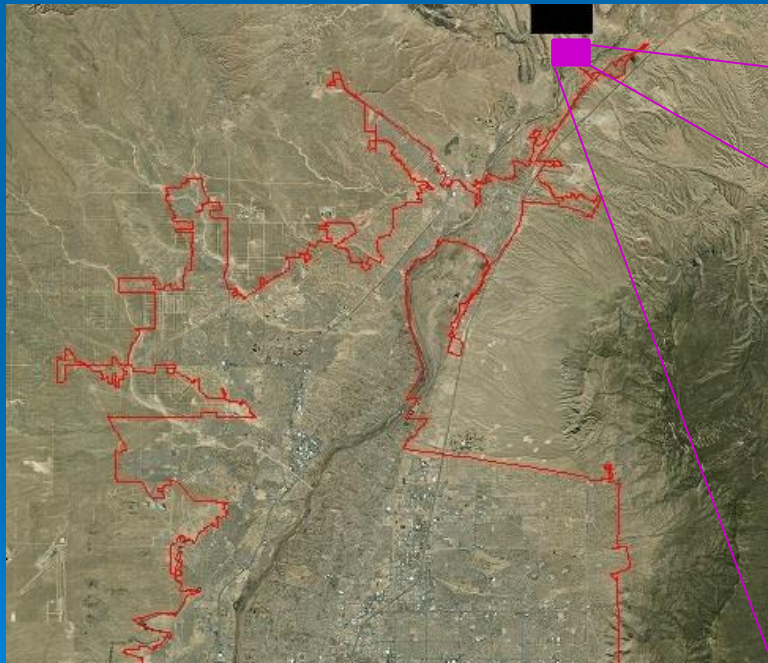
Wet Weather Monitoring

- ◆ Middle Rio Grande Conservancy District
 - ◆ Instead of trying to monitor stormwater discharged into the MRGCD irrigation canal network, monitoring upstream and downstream sampling locations are moved to above and below MRGCD diversions and outfalls
 - ◆ Impacts to entire watershed



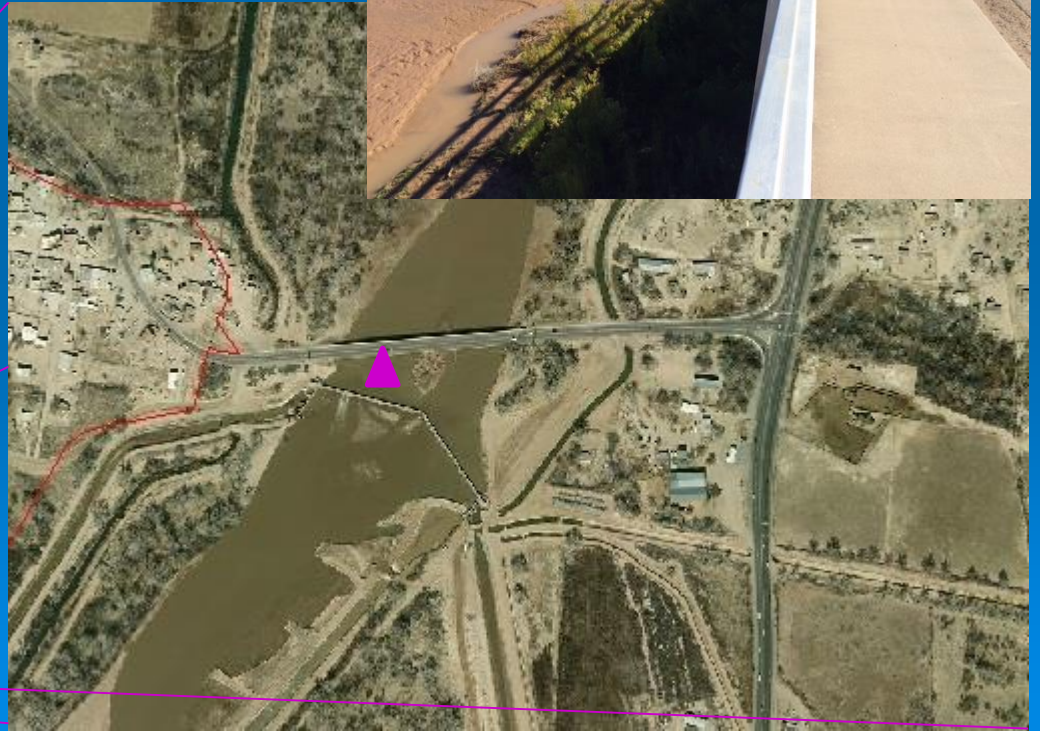
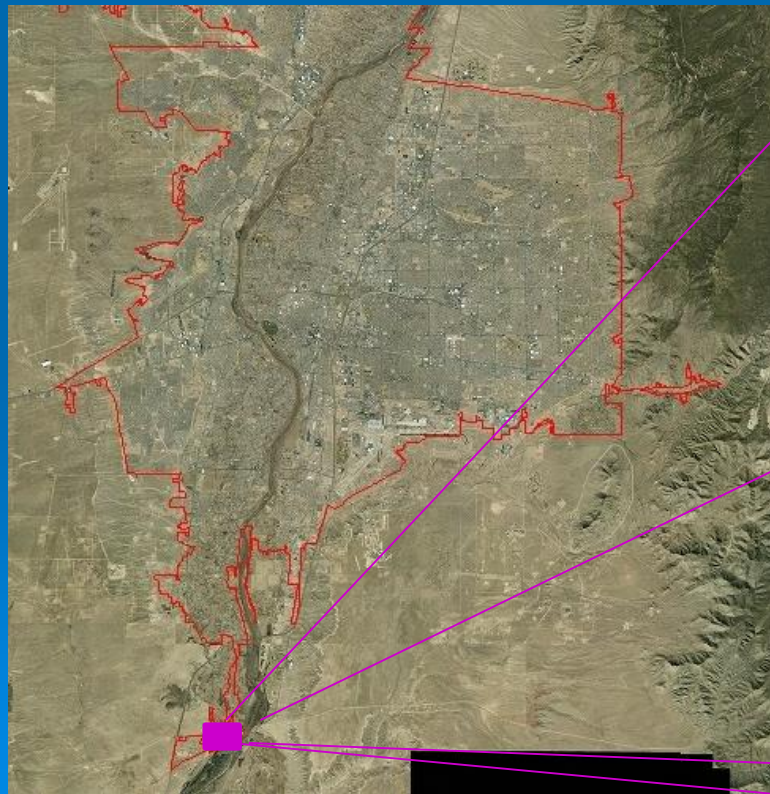
MRG MS4 Permit Wet Weather Monitoring

- ◆ Upstream sampling location



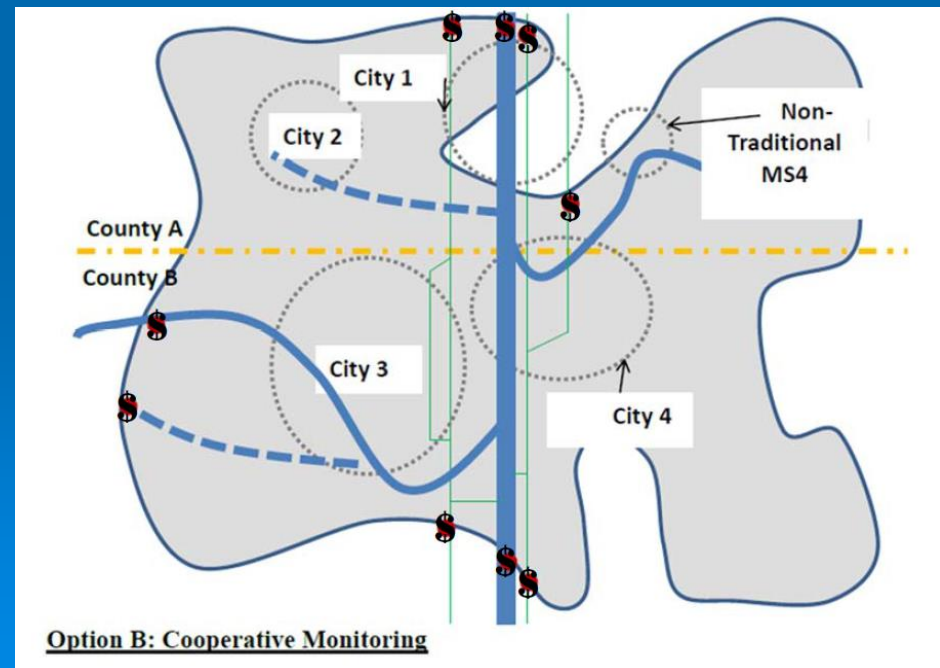
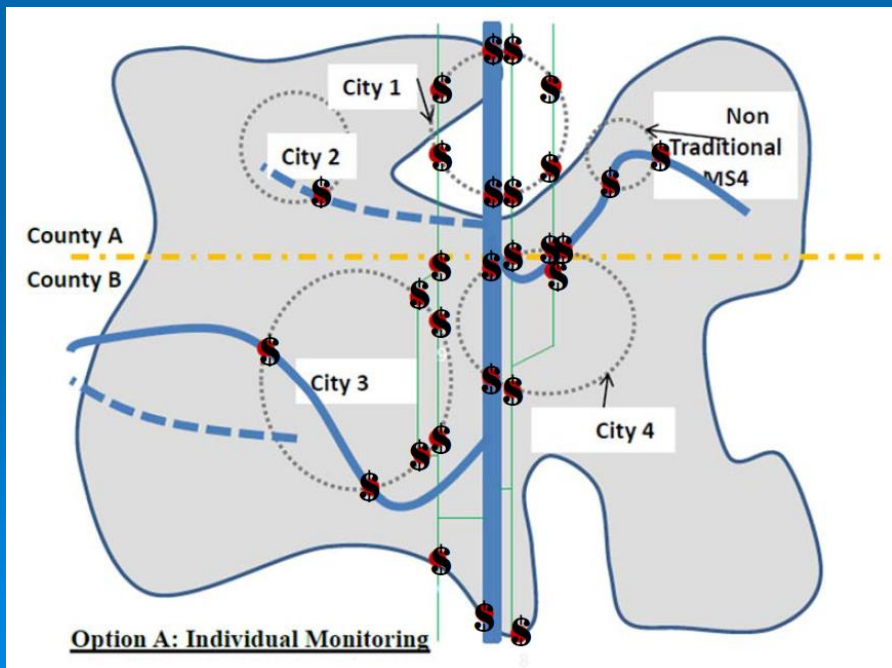
MRG MS4 Permit Wet Weather Monitoring

- ◆ Downstream sampling location



MRG MS4 Permit Wet Weather Monitoring

- ◆ Cooperation- Wet weather monitoring
 - ◆ Significant permit incentive for MS4s to cooperate on monitoring



Middle Rio Grande Watershed-based MS4 Permit

Wet Weather Monitoring

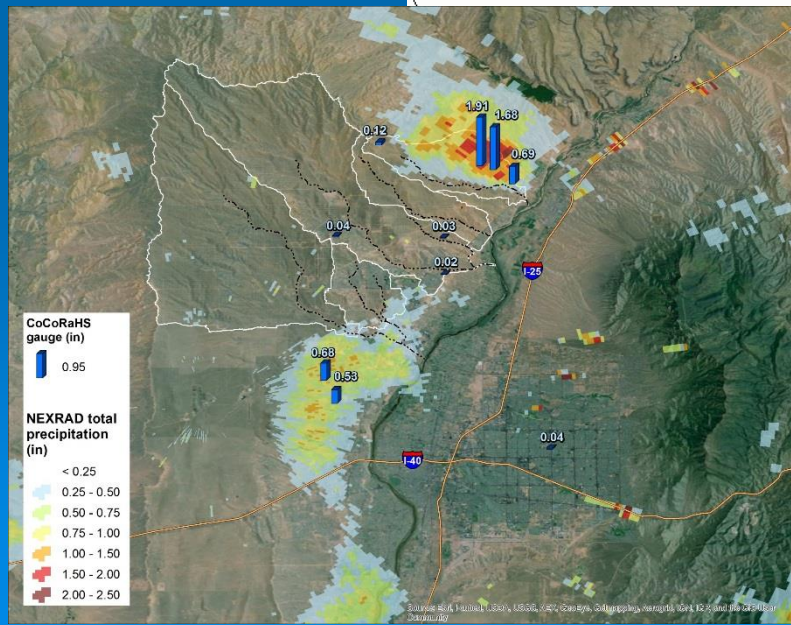
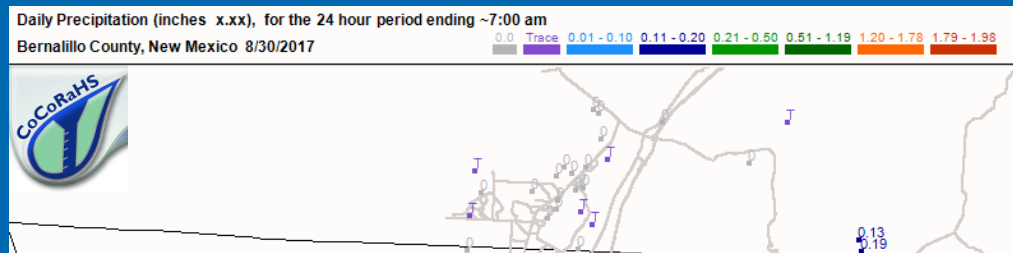
- ◆ What is a qualifying storm?
 - ◆ Permit: 0.25 inches of ppt in a 24-hour period
- ◆ Rarely rains over the entire watershed – first flush
- ◆ Worked with NMED and EPA to address: now a qualifying storm is any storm within the watershed with total precipitation of 0.25 inches or more
- ◆ Storm events in New Mexico are isolated, scattered
- ◆ Dry, hydrophobic soils can yield more runoff



MRG MS4 Permit Wet Weather Monitoring

◆ Weather in New Mexico

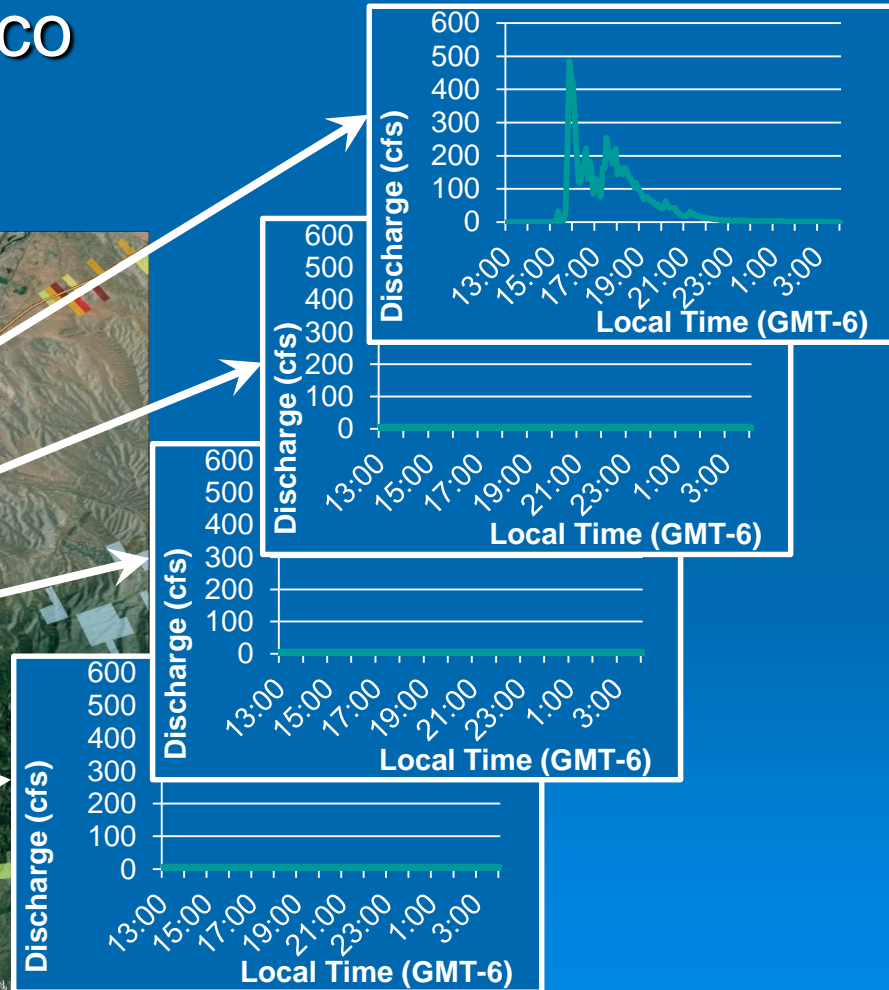
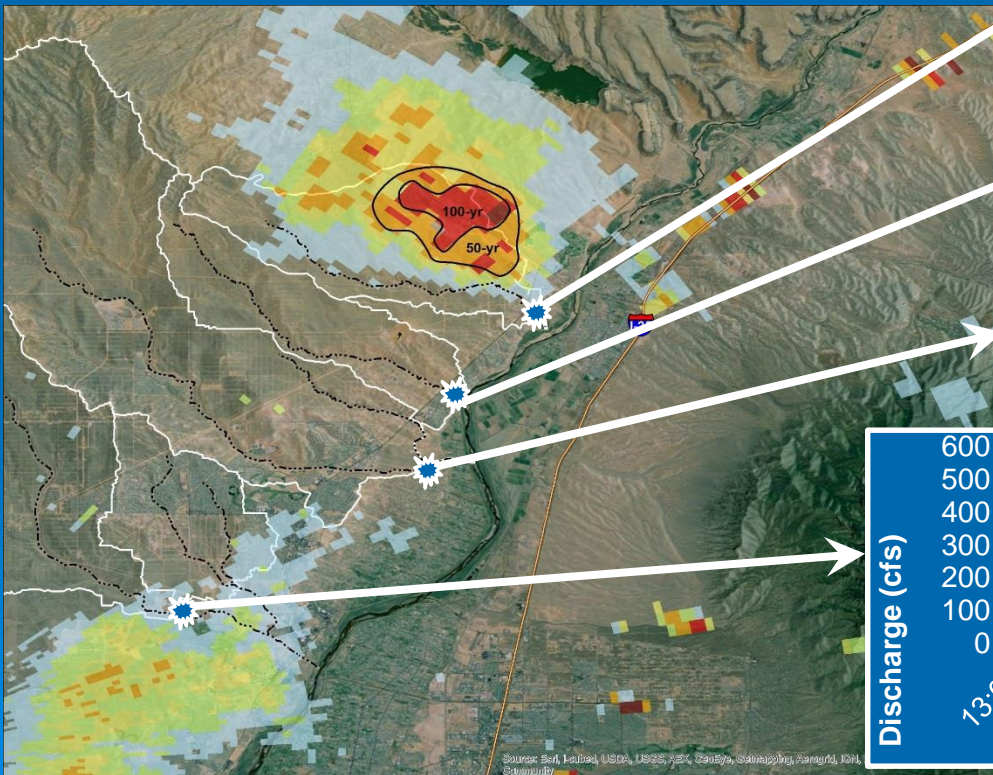
- ◆ Storms occur over very short periods of time
- ◆ Storms are very localized
- ◆ Upstream sampling must occur prior to event



MRG MS4 Permit

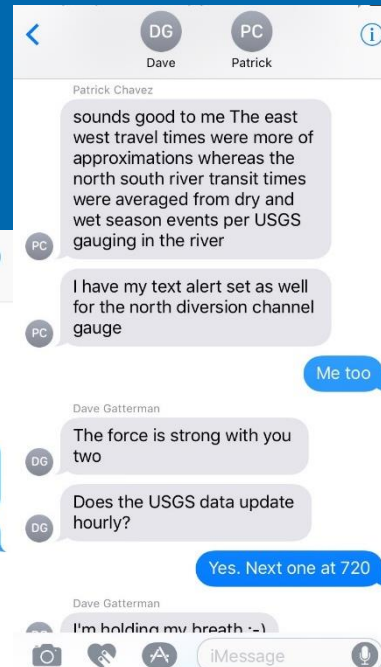
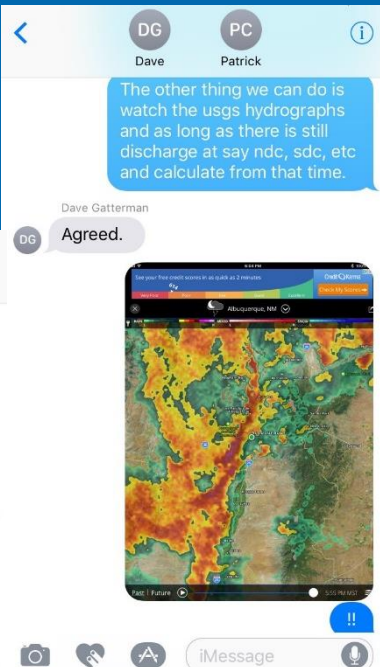
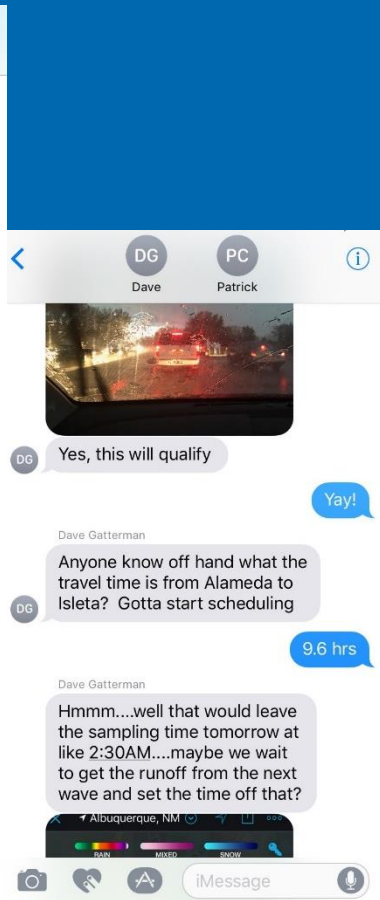
Wet Weather Monitoring

- ◆ Weather in New Mexico
 - ◆ Did the storm discharge?



Source: SRT, Federal, USDA, USGS, NCEM, Georgia, Schaeffgen, Haverford, PA, Community

Middle Rio Grande Watershed-based MS4 Permit



MRG MS4 Permit

Wet Weather Monitoring

Sample Timing

- ◆ For downstream, in-stream sampling, it can take as long as 15 hours for the stormwater plug to make it to the sampling point

Example CoCoRaHS Rain Gages and Assumed Travel Times for Sampling Stormwater Events in Watershed						
Zonal Segments of River (north to south travel times)		Western Side of Watershed (west to east travel times)		Rio Grande	Eastern Side of Watershed (east to west travel times)	
		3 hours -->	1.5 hours -->		<-- 20 min.	<-- 40 min.
7.4 hours	Rio Grande at Angostura to Rio Grande at Alameda	NM-SN-59	NM-SN-70		N/A	N/A
4.4 hours	Rio Grande at Alameda to Rio Grande at Central	NM-BR-113	NM-BR-144		NM-BR-71	NM-BR-162
5.2 hours	Rio Grande at Central to Rio Grande at Isleta 147 Bridge	NM-BR-159	NM-BR-104		NM-BR-150	NM-BR-41

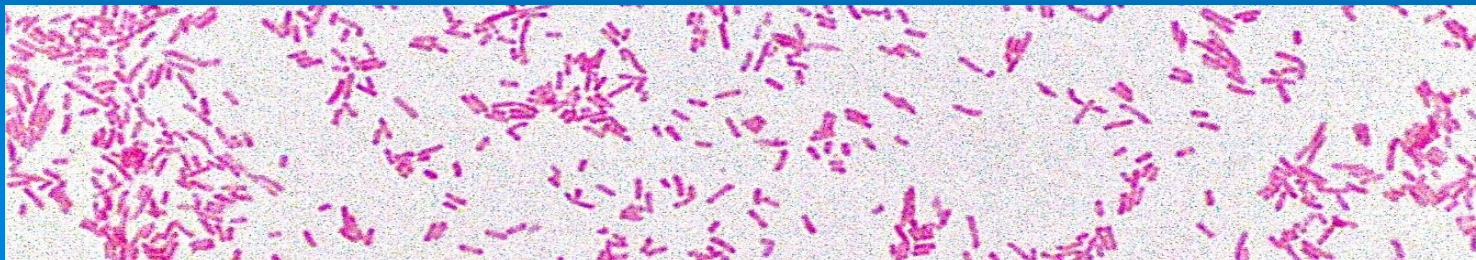
TABLE 1 – HYDROGRAPH TIMING FOR RAIN EVENTS TO SOUTHERN SAMPLING POINT

MRG MS4 Permit

Wet Weather Monitoring

Challenges

- ◆ Predicted events don't always pan out
 - ◆ Upstream samples have to be collected prior to qualifying event
- ◆ Qualifying event but where did it discharge?
 - ◆ Minimal runoff depending on location of storm event
 - ◆ Volume of runoff may be insufficient to push water out of ponds and other flood/water quality features
- ◆ Rainfall event may occur outside of laboratory hours
 - ◆ Exceed some hold times, specifically E. coli
 - ◆ During the 2016 wet season, **52%** of the 27 qualifying events occurred on weekends/holidays/after lab hours



MRG MS4 Permit

Wet Weather Monitoring

- ◆ Per Section 303(d) of the CWA, impairments in the MRG list include:
 - ◆ Dissolved Oxygen
 - ◆ Gross alpha
 - ◆ PCBs
 - ◆ Temperature
- ◆ Total Maximum Daily Load (TMDL) in the MRG for E. coli
 - ◆ A TMDL establishes the maximum amount of a pollutant allowed in a waterbody; used as a tool for restoring water quality



MRG MS4 Permit

Wet Weather Monitoring

◆ Wet weather monitoring

◆ Required analytes:

- | | | |
|-------------------------|-----------------|--------------|
| ◆ TSS | Phosphorus | TDS |
| ◆ COD | BOD5 | E. coli |
| ◆ Ammonia | Nitrate/nitrite | TKN |
| ◆ Dissolved oxygen | pH | Oil & Grease |
| ◆ PCBs | Gross Alpha | |
| ◆ Copper and lead | Conductivity | |
| ◆ Hardness | | |
| ◆ Temperature | | |
| ◆ Select VOCs and SVOCs | | |



MRG MS4 Permit TMDL

- ◆ How do we calculate a waste load (WL) from a resultant concentration?

Hall Environmental Analysis Laboratory, Inc.		Analytical Report					
		Lab Order 1608105					
		Date Reported: 8/9/2016					
CLIENT: AMAFCA		Client Sample ID: Rio Grande North					
Project: CMC		Collection Date: 8/2/2016 1:10:00 PM					
Lab ID: 1608105-001	Matrix: AQUEOUS	Received Date: 8/2/2016 2:20:00 PM					
Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
SM 9223B FECAL INDICATOR: E. COLI MPN							Analyst: tnc
E. Coli	28.1	1.000		CFU/100ml	1	8/3/2016 5:16:00 PM	26757
Equivalent to MPN/100 mL							

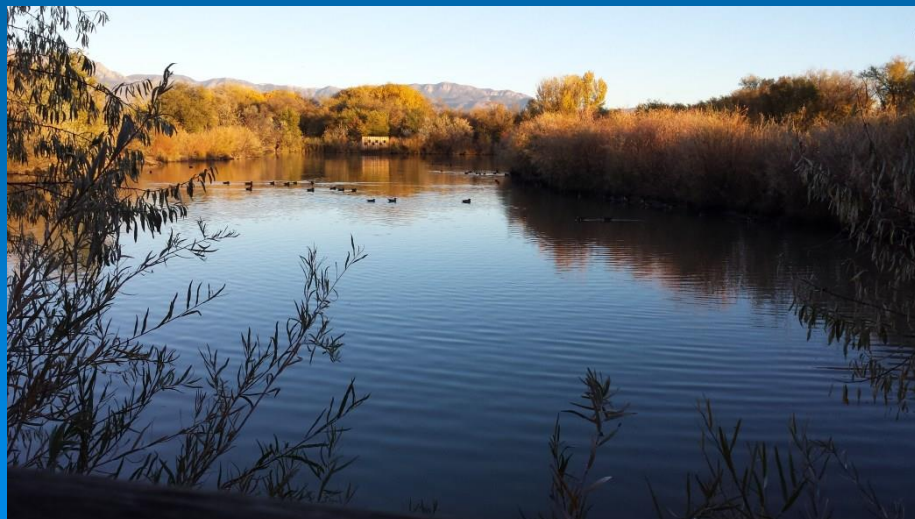


MRG MS4 Permit Waste Load Calculation

E. Coli Loading Calculation:

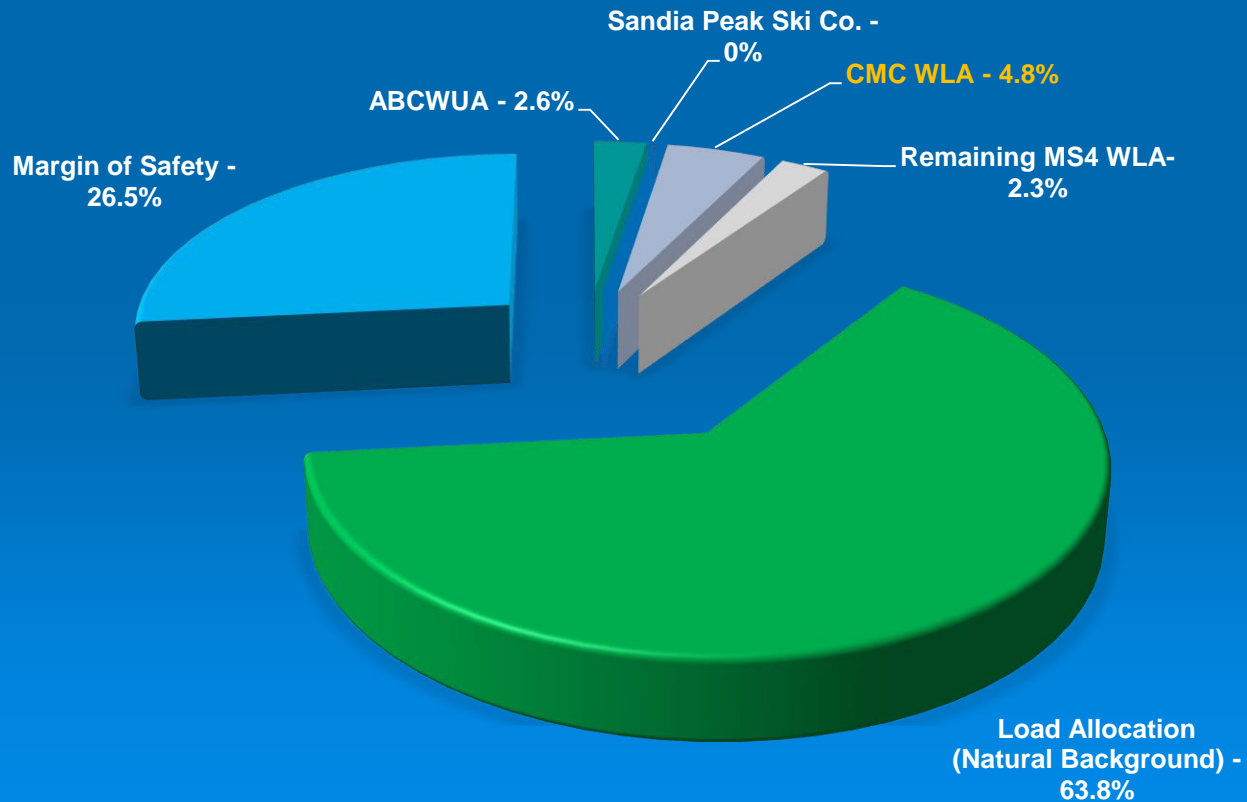
$$E. \text{ Coli Concentration } \left(\frac{CFU}{100mL} \right) \times 28,316.85 \left(\frac{mL}{ft^3} \right) \times \text{Mean Daily Flow } \left(\frac{ft^3}{sec} \right) \times 3,600 \left(\frac{sec}{hr} \right) \times 24 \left(\frac{hr}{day} \right) = E. \text{ coli Loading } \left(\frac{CFU}{day} \right)$$

Monitoring Location	E. coli Concentration (CFU/100 mL)	Daily Mean Flow (cfs)	E. coli Loading (CFU/day)
Rio Grande North	28.1	639	4.39E+11
Rio Grande South	1,106	703	1.90E+13
Delta in E. coli Loading Between North and South Locations			1.86E+13



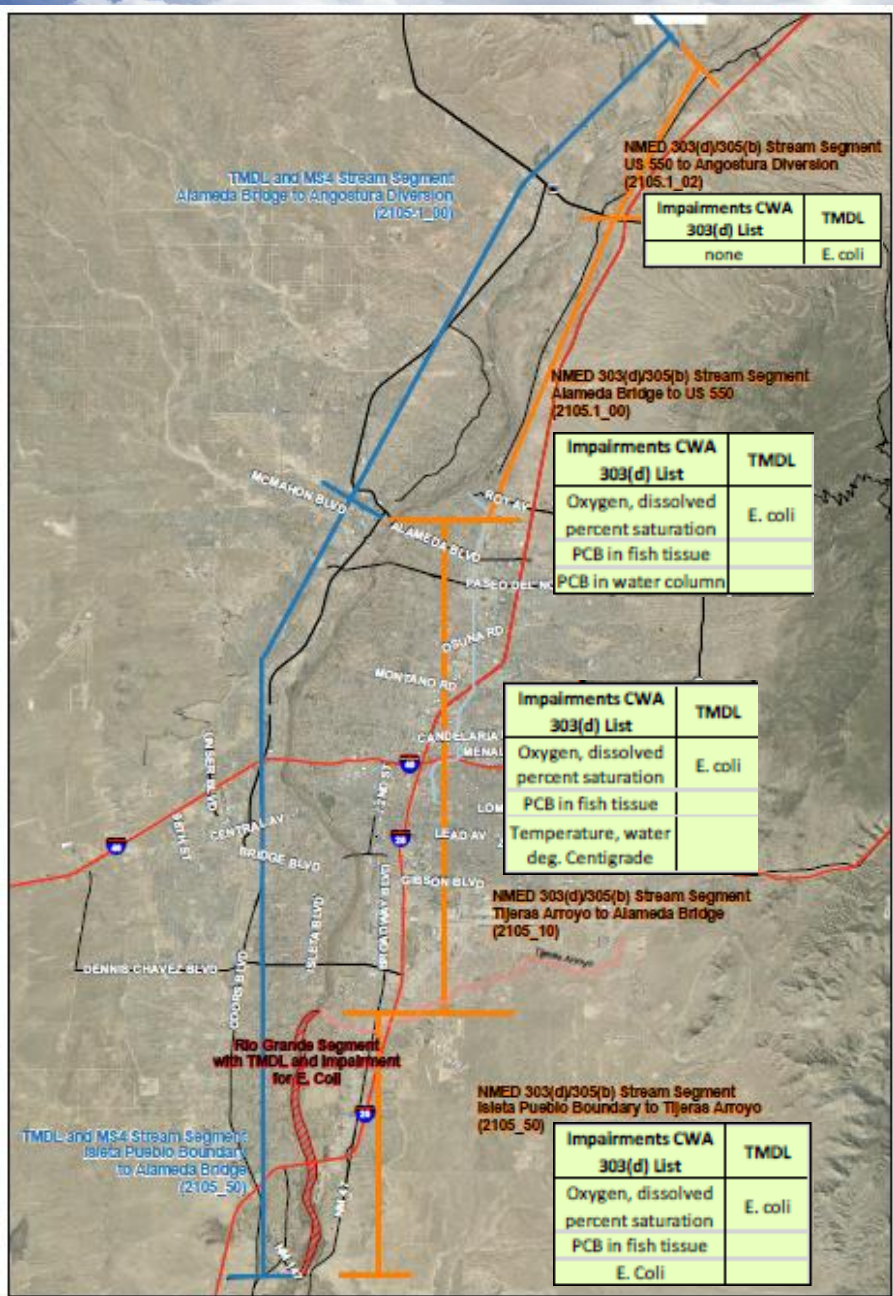
MRG MS4 Permit TMDL

**TMDL - ALLOWED LOAD ALLOCATIONS - ISLETA TO
ALAMEDA -
HIGH FLOW CONDITIONS IN THE RIVER**





New Mexico Environment Department MRG stream segments and assessment units



Legend

- TMDL/MS4 Stream Segments
- NMED Stream Segments
- North Diversion Channel
- Rio Grande Segment w/ TMDL and Impairment for E. Coli
- Interstate Highway
- U.S. Highway
- State Highway

AMAPCA
BOHANNAN HUSTON

CMC Monitoring
Figure 7
Rio Grande
NMED and MS4 Permit
Stream Segments

0 0.5 1 2
Miles

February 2011

MRG MS4 Permit Waste Load Calculation

Calculate E. coli loading per stream segment reach and compare to total TMDL:

Stream Segment	Stream Name / Related USGS Gage	Contributing Area Ratio for Each Segment	E. coli Loading (CFU/day) for Each Segment	Total TMDL for Segment	TMDL Exceedance?
2105.1_00	Alameda to Angostura Non-Pueblo Alameda Bridge to Angostura Diversion / 08329928 - Rio Grande near Alameda	0.77	1.43E+13	5.83E+11	TMDL Exceeded
2105_50	Isleta to Alameda Isleta Pueblo Boundary to Alameda Street Bridge / 0833000 - Rio Grande at Albuquerque, NM (Central)	0.23	4.27E+12	9.03E+11	TMDL Exceeded

MRG MS4 Permit Waste Load Calculation

Calculate CMC MS4 E. coli loading per stream segment reach – apply percent based on CMC WLA compared to total TMDL:

Stream Segment	Stream Name / Related USGS Gage	Flow Conditions	Percent of E. coli Associated with CMC Members	Total CMC E. coli Loading (CFU/day) for Each Segment
2105.1_00	Alameda to Angostura Non-Pueblo Alameda Bridge to Angostura Diversion / 08329928 - Rio Grande near Alameda	Dry	5.9%	8.38E+11
2105_50	Isleta to Alameda Isleta Pueblo Boundary to Alameda Street Bridge / 0833000 - Rio Grande at Albuquerque, NM (Central)	Mid	5.5%	2.36E+11

MRG MS4 Permit Waste Load Calculation

Compare Storm Event E. coli loading to WLA for CMC:

Stream Segment	Stream Name / Related USGS Gage	CMC E. coli Loading (CFU/day) for Each Segment	Flow Conditions	WLA for CMC for Flow Conditions	WLA - Potential Exceedance or Acceptable
2105.1_00	Alameda to Angostura Non-Pueblo Alameda Bridge to Angostura Diversion / 08329928 - Rio Grande near Alameda	8.38E+11	Dry	3.24E+10	WLA Potential Exceedance
2105_50	Isleta to Alameda Isleta Pueblo Boundary to Alameda Street Bridge / 0833000 - Rio Grande at Albuquerque, NM (Central)	2.36E+11	Mid	4.22E+10	WLA Potential Exceedance

MRG MS4 Permit TMDL

◆ Water Quality Standard for E. coli

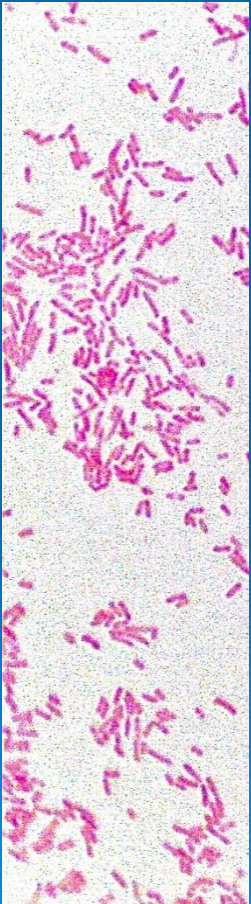
◆ Isleta Pueblo standard water quality standard:

- ◆ Geometric mean maximum *Escherichia coli* (E. coli): 47 per 100mL (geometric mean calculation based on a minimum of five samples taken over a maximum of 30 days) single sample maximum: 88 colonies/100 mL

◆ NMED water quality standard

- ◆ Primary contact: The monthly geometric mean of E. coli bacteria of 126 cfu/100 mL or MPN/100 mL and single sample of 410 cfu/100 mL or MPN/100 mL

Isleta: <https://www.epa.gov/sites/production/files/2014-12/documents/isleta-tribe.pdf>
NMED: <http://164.64.110.239/nmac/parts/title20/20.006.0004.pdf>



MRG MS4 Permit TMDL

Table D.1- Rio Grande (non-Pueblo Alameda Bridge to Angostura Diversion)

Station	Date	Result (cfu/100mL)	Flow (cfs) ¹	Rainfall (inches) ²
USGS 8329918	2/18/2004	480	408	0
USGS 8329918	4/26/2004	110	953	0
USGS 8329918	7/20/2004	50	528	0
USGS 8329918	11/9/2004	>5300	504	0.03
30RGrand473.7	3/23/2005	10.8	928	0
32RGrand464.2	3/23/2005	11	928	0
32RGrand458.0	3/23/2005	13.4	928	0
32RGrand445.4	3/23/2005	41.4	928	0
USGS 8329918	5/5/2005	-8	4070	0
30RGrand473.7	5/26/2005	27.5	5580	0
32RGrand464.2e	5/26/2005	32.7	5580	0
32RGrand464.2	5/26/2005	42.8	5580	0
32RGrand458.0	5/26/2005	42.6	5580	0
32RGrand445.4e	5/26/2005	40.4	5580	0
32RGrand445.4	5/26/2005	47.3	5580	0
30RGrand473.7	6/23/2005	13.4	4300	0
32RGrand464.2e	6/23/2005	23.1	4300	0
32RGrand464.2	6/23/2005	22.6	4300	0
32RGrand458.0	6/23/2005	35	4300	0
32RGrand445.4e	6/23/2005	81.3	4300	0
32RGrand445.4	6/23/2005	249.5	4300	0
30RGrand473.7	7/27/2005	98.5	463	0
32RGrand464.2	7/27/2005	488.4	463	0
32RGrand464.2e	7/27/2005	325.5	463	0
32RGrand458.0	7/27/2005	41.1	463	0
32RGrand445.4	7/27/2005	62.2	463	0
32RGrand445.4e	7/27/2005	41.7	463	0
USGS 8329918	8/24/2005	<100	474	0
30RGrand473.7	8/24/2005	52.1	474	0
32RGrand464.2e	8/24/2005	50.4	474	0
32RGrand458.0	8/24/2005	7.2	474	0
32RGrand445.4e	8/24/2005	77.6	474	0
32RGrand445.4	9/28/2005	149.7	541	0
32RGrand458.0	9/28/2005	90.9	541	0
32RGrand464.2	9/28/2005	95.9	541	0
30RGrand473.7	9/28/2005	90.9	541	0
32RGrand445.4	10/26/2005	231	299	0
32RGrand458.0	10/26/2005	133.4	299	0
32RGrand464.2	10/26/2005	153.9	299	0
30RGrand473.7	10/26/2005	63.1	299	0
USGS 8329918	12/12/2005	1000	518	0
USGS 8329918	4/25/2006	670	555	0
USGS 8329918	8/15/2006	4100	1980	0
USGS 8329918	12/5/2006	<1	825	0
USGS 8329918	5/4/2007	>180	2280	0

Red values indicate those above the State and Tribal water quality standard.

Blue values indicate those above the Tribal water quality standards.

¹ USGS gage 0829928

² Angostura NMSU weather site. Rainfall data for the previous day was used.

Table D.2- Rio Grande (Isleta Pueblo bnd to Alameda Bridge)

Station	Date	Result (cfu/100mL)	Flow (cfs) ¹	Rainfall (inches) ²
USGS 8330000	12/8/2004	1000	859	0
32RGrand419.7	3/23/2005	43.5	873	0
USGS 8330000	4/8/2005	<47	1100	0
32RGrand419.7	5/26/2005	40.4	5610	0
32RGrand419.7	6/22/2005	1553.1	4230	0
USGS 8330000	7/7/2005	20	1290	0
32RGrand419.7	7/27/2005	245.3	392	0
USGS 8330000	8/12/2005	1000	486	0
32RGrand419.7	8/24/2005	290.9	363	0
32RGrand419.7	9/28/2005	275.5	393	0
32RGrand419.7	10/26/2005	290.9	281	0
USGS 8330000	2/22/2006	>2	570	0
USGS 8330000	5/17/2006	28	554	0
USGS 8330000	7/19/2006	>1	498	0
USGS 8330000	5/8/2007	120	2530	0
USGS 8330000	6/25/2007	730	674	0

Red values indicate those above the State and Tribal water quality standard.

Blue values indicate those above the Tribal water quality standards.

¹ USGS gage 08330000

² Albuquerque International Airport weather site. Rainfall data for the previous day was used

MRG MS4 Permit Waste Load Calculation

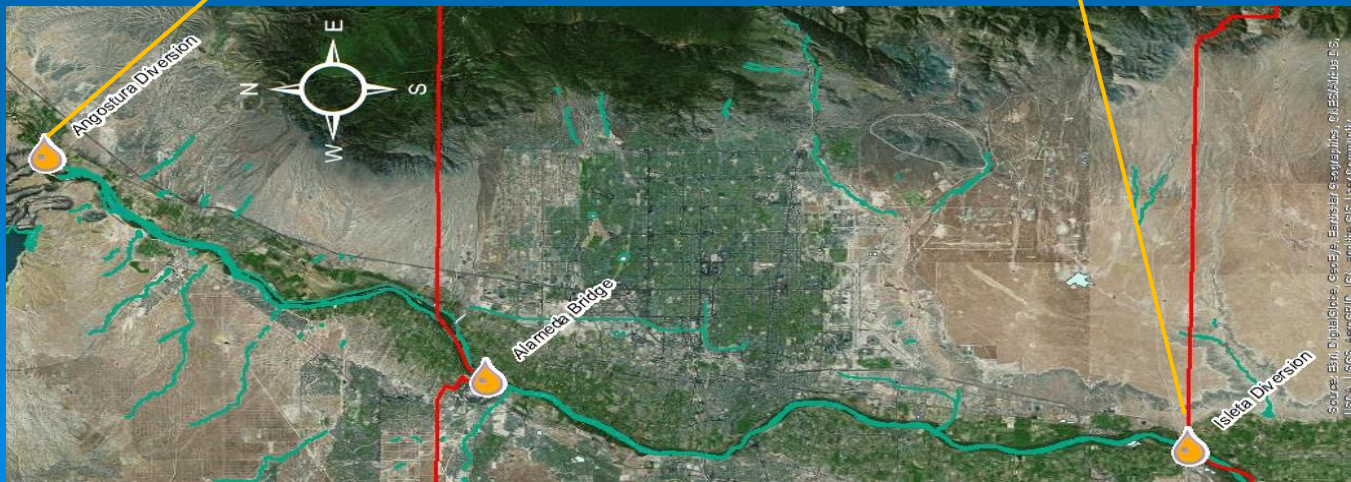
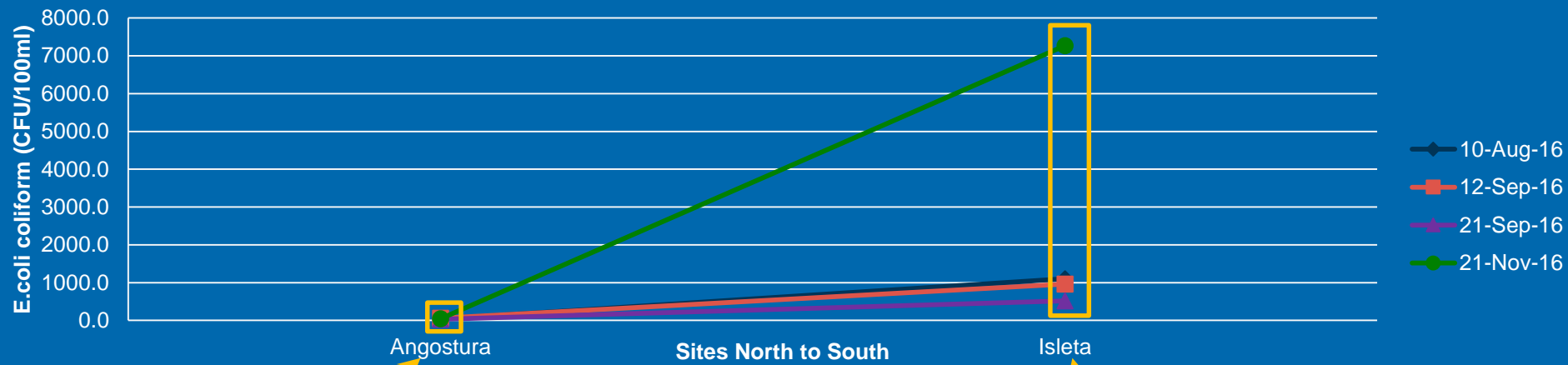
US EPA Approved, Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed, June 30, 2010, page 40:

It is important to remember that the TMDL is a planning tool to be used to achieve water quality standards. Since flows vary throughout the year in these systems the target load will vary based on the changing flow. Management of the load to improve stream water quality and meet water quality criteria should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.



MRG MS4 Permit TMDL

E.coli Coliform Levels – CMC Sampling 2016



MRG MS4 Permit E. coli Monitoring

CMC Sample Locations for Water Quality Monitoring

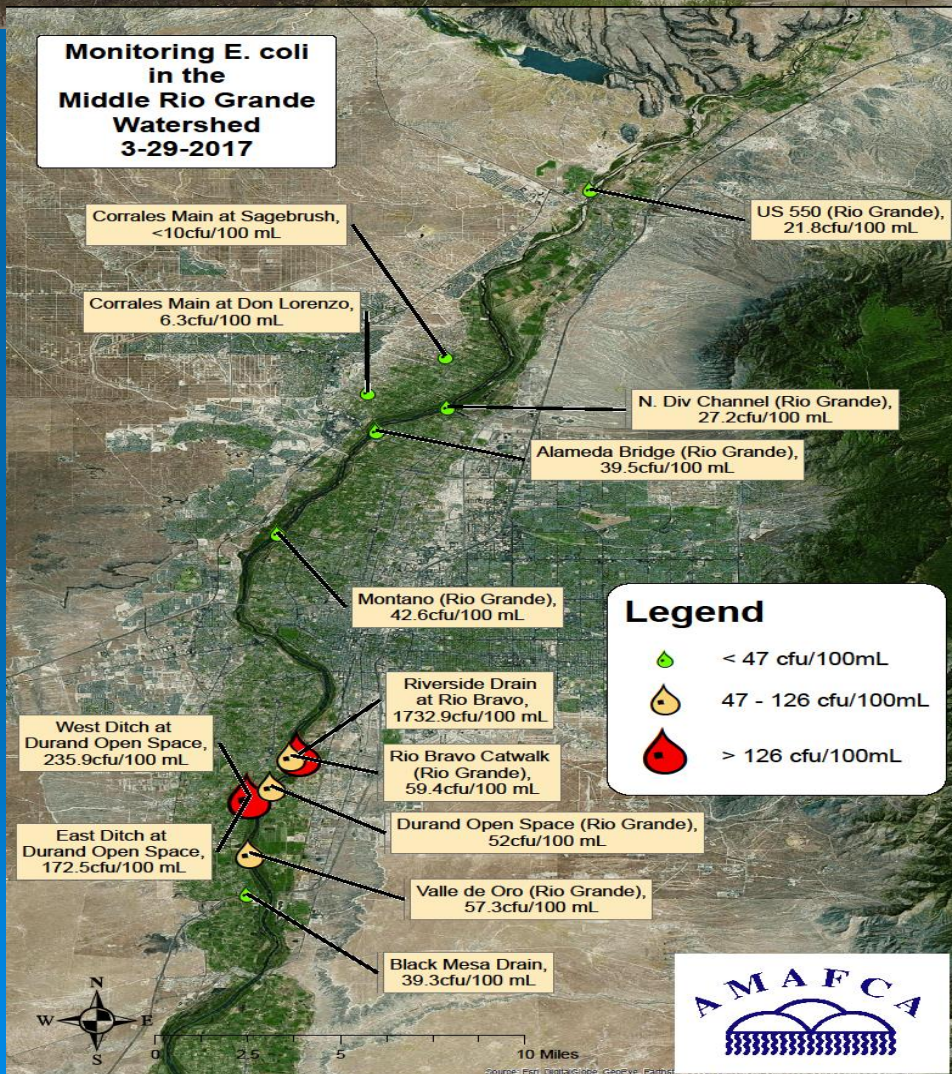
- Legend**
-  CMC Sampling Locations
 -  Bernalillo County Boundary



<i>Sample Location</i>	Rio Grande North	Rio Grande South
<i>Site Name</i>	Angostura - Alameda	Alameda - Isleta
<i>Date</i>	Combined WLA for Cooperative (CFU/day)	
10-Aug-16	3.24E+10	4.22E+10
12-Sep-16	3.24E+10	1.57E+10
21-Sep-16	1.68E+10	3.42E+09
21-Nov-16	No Value	4.22E+10
	CMC MS4 E.coli Loading Per Reach (CFU/day)	
10-Aug-16	7.91E+13	3.19E+13
12-Sep-16	4.99E+13	1.56E+13
21-Sep-16	1.31E+13	1.77E+12
21-Nov-16	--*	2.33E+14
	WLA Exceed/Acceptable?	
10-Aug-16	Exceed	Exceed
12-Sep-16	Exceed	Exceed
21-Sep-16	Exceed	Exceed
21-Nov-16	Acceptable	Exceed

*No WLA was made for this flow regime of the Rio Grande, so no exceedance/acceptable calculation was done

MRG MS4 Permit *E. coli* Monitoring

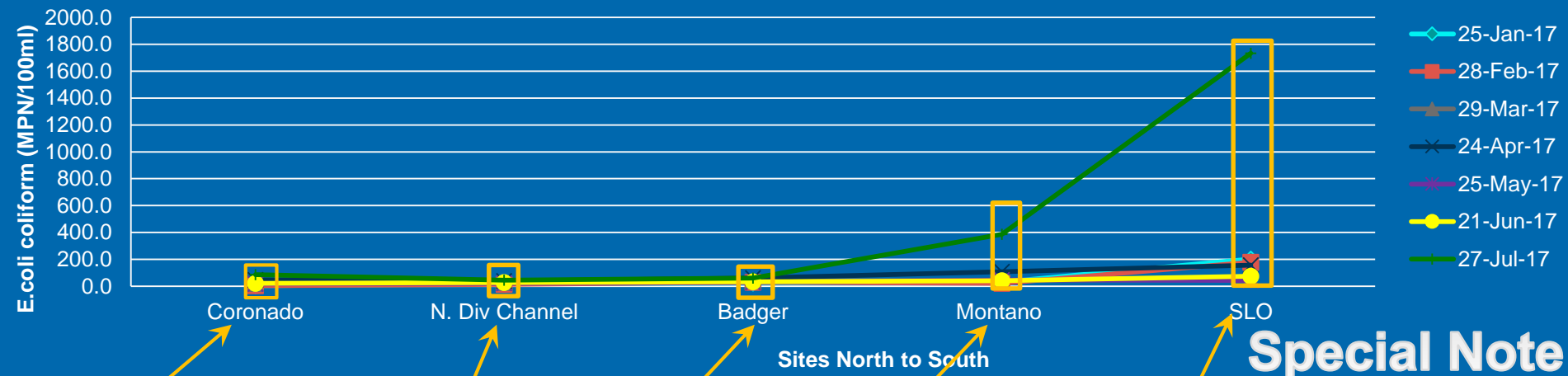


- ◆ Dry weather sampling locations for *E. coli* monitoring

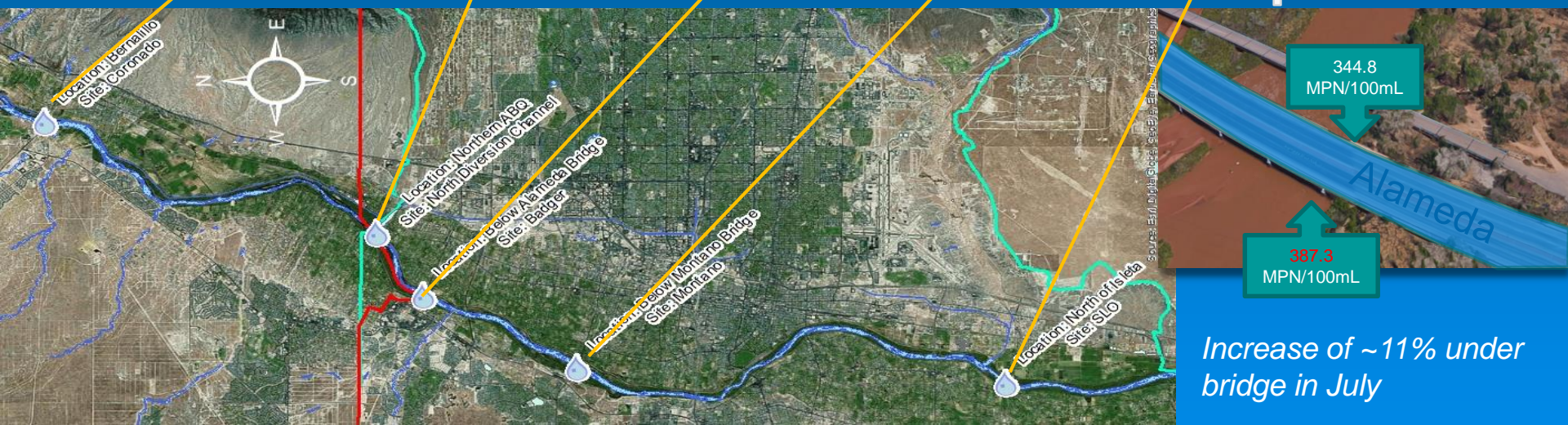


MRG MS4 Permit *E. coli* Monitoring

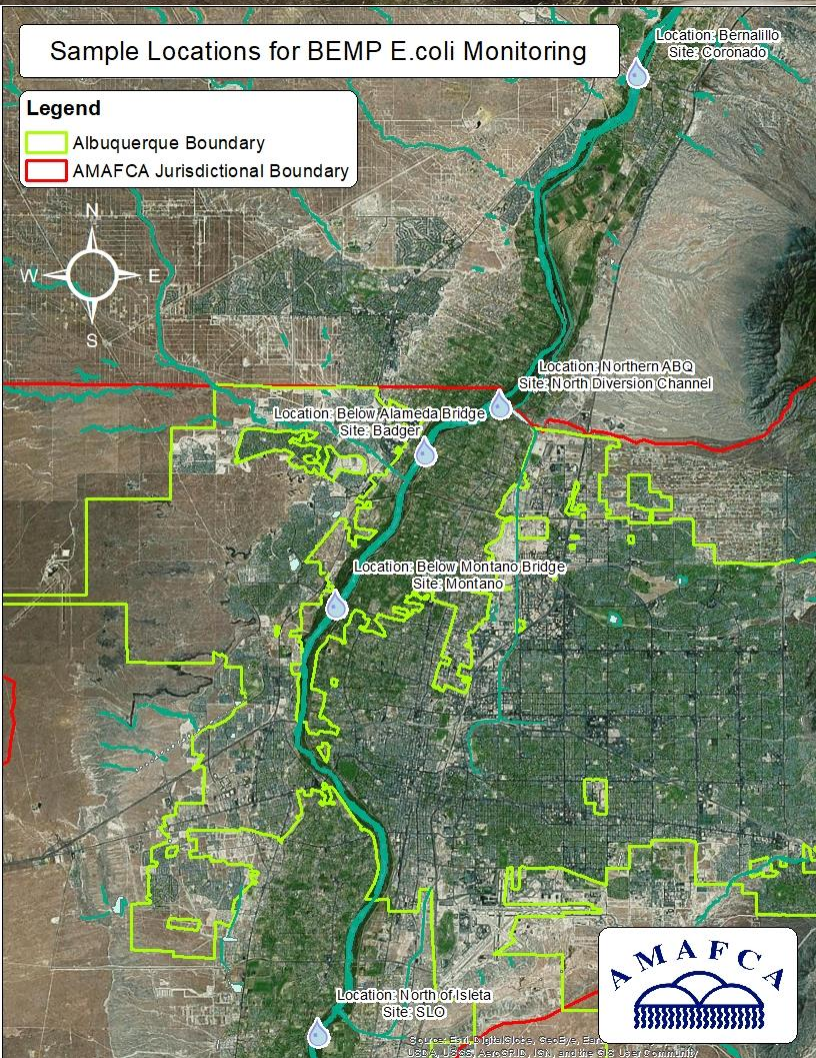
E.coli Coliform Levels – BEMP Sampling 2017



Special Note



MRG MS4 Permit E. coli Monitoring

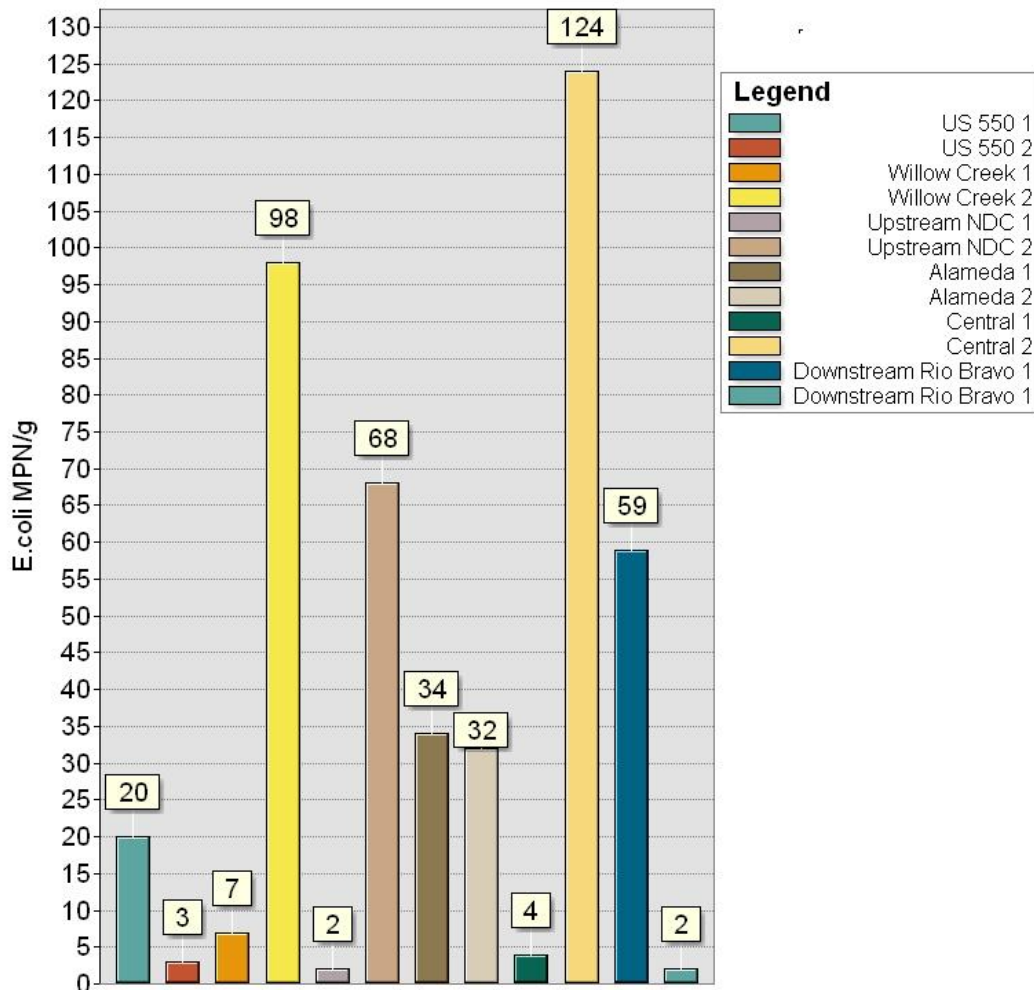


Date	River Stretch			
	Coronado - NDC	NDC- Badger	Badger - Montano	Montano - SLO
<i>Combined WLA for Cooperative (CFU/day)</i>				
25-Jan-17	No Value	No Value	4.22E+10	4.22E+10
28-Feb-17	9.09E+10	9.09E+10	4.22E+10	4.22E+10
29-Mar-17	9.09E+10	9.09E+10	2.51E+11	2.51E+11
24-Apr-17	3.14E+11	3.14E+11	2.51E+11	2.51E+11
25-May-17	9.09E+10	9.09E+10	6.29E+10	6.29E+10
21-Jun-17	9.09E+10	9.09E+10	6.29E+10	6.29E+10
27-Jul-17	No Value	No Value	1.57E+10	1.57E+10
<i>CMC MS4 E.coli Loading per Reach (CFU/day)</i>				
25-Jan-17	--	--	4.61E+11	1.67E+13
28-Feb-17	1.35E+12	2.32E+12	0.00E+00	1.74E+13
29-Mar-17	2.84E+12	6.47E+12	3.54E+12	4.71E+12
24-Apr-17	0.00E+00	1.42E+13	2.94E+13	2.58E+13
25-May-17	1.96E+12	2.50E+12	9.49E+12	0.00E+00
21-Jun-17	1.08E+12	8.35E+11	8.75E+11	3.52E+12
27-Jul-17	--	--	1.24E+13	5.55E+13
<i>WLA Exceed or Acceptable?</i>				
25-Jan-17	Acceptable ¹	Acceptable ¹	Exceed	Exceed
28-Feb-17	Exceed	Exceed	Acceptable ²	Exceed
29-Mar-17	Exceed	Exceed	Exceed	Exceed
24-Apr-17	Acceptable ²	Exceed	Exceed	Exceed
25-May-17	Exceed	Exceed	Exceed	Acceptable ²
21-Jun-17	Exceed	Exceed	Exceed	Exceed
27-Jul-17	Acceptable ²	Acceptable ²	Exceed	Exceed

¹ No WLA was made for this flow regime of the Rio Grande, so no exceedance /acceptable calculation was done

² E.coli levels decreased in the stretch between sample sites

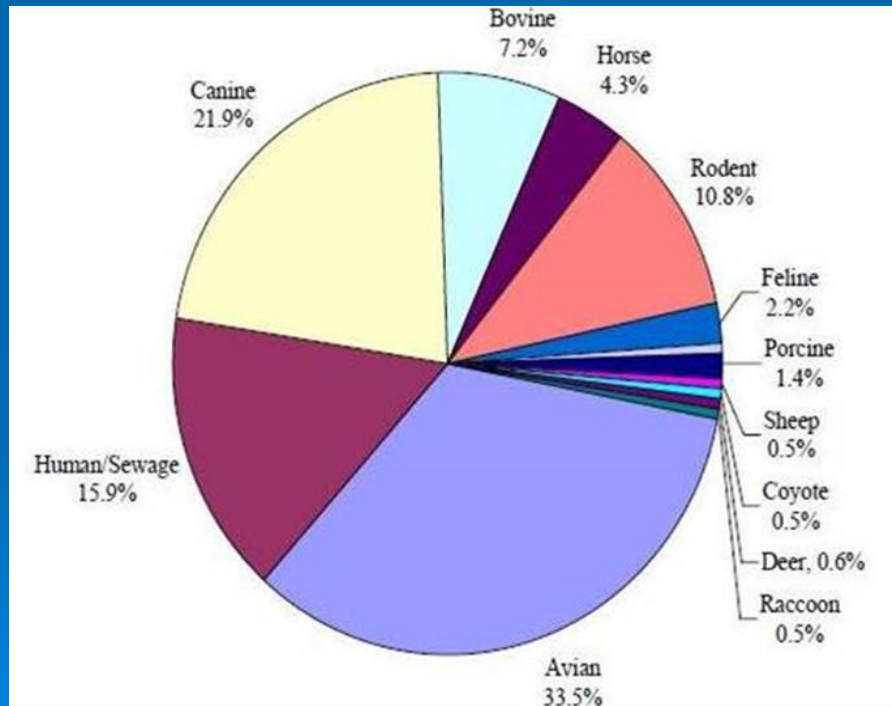
MRG MS4 Permit *E. coli* Monitoring



**E. coli concentrations in
riverbed sediment**

MRG MS4 Permit *E. coli* Monitoring

◆ Sources of e. coli



- ◆ Wildlife
- ◆ Pet waste
- ◆ Septic systems
- ◆ Sewer line leaks
- ◆ Improper waste disposal
- ◆ Regrowth?

Middle Rio Grande Watershed-based MS4 Permit

◆ Next?

- ◆ Have collected 5 of 7 required wet weather monitoring samples for this permit cycle
- ◆ High flow suspension?
- ◆ Revisit TMDL with new data
- ◆ Continue/enhance BMPs including outreach and education
- ◆ Source tracking study
- ◆ Southern sampling point access issues

