

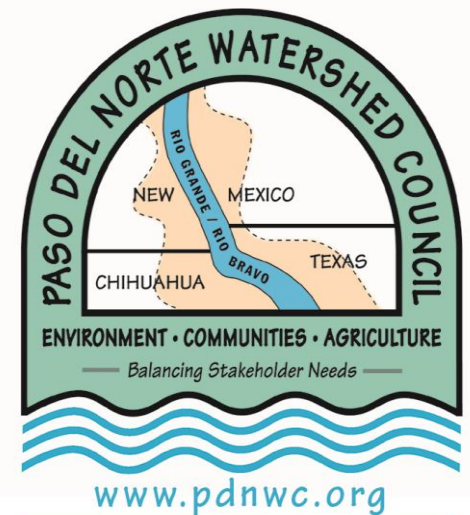
# PdNWC Watershed Restoration Planning Project for the El Paso-Las Cruces Watershed



Paso del Norte Watershed  
Council Meeting

January 18, 2013

Chris Canavan, NMED



# PROJECT TIMELINE / ACTIVITIES

- State of New Mexico issued a TMDL for *E. coli* bacteria in 2007.
- PdNWC received 319(h) grants in 2006 and 2010.
- Preliminary watershed plan produced in 2008.
- The preliminary plan recommended a water quality sampling program and increased stakeholder outreach.
- Monthly sampling effort initiated in 2008 to present.
- Working group stakeholder meetings held.



# E. COLI BACTERIA AS A POLLUTANT

- Enters the environment via feces of warm blooded animals.
- Most strains of *E. coli* are not harmful to humans.
- *E. coli* is used as an indicator of fecal contamination.
- Potential diseases: typhoid, hepatitis A, dysentery, and cholera.
- *E. coli* O157 is toxic (spinach, lettuce, salsa incidents).
- WQ Standard in New Mexico for *E. coli* is-
  - 126 coliform-forming units/mL (geometric mean).
  - 410 cfu/mL (single sample).

WHY SHOULD WE BE CONCERNED?



Fresh vegetables are grown in the region.





Swimming is enjoyed by many in the heat of the summer.

# Nine Elements of the Watershed Plan

- a. Identification of causes and sources
- b. Estimate of needed load reductions
- c. Description of management measures
- d. Estimate of technical and financial assistance
- e. Information / education component
- f. Schedule for implementation
- g. Description of measureable milestones
- h. Criteria developed to determine if load reductions are achieved
- i. Monitoring component to evaluate effectiveness

CWA Section 319 Grant Guidelines:

[http://www.epa.gov/owow\\_keep/NPS/cwact.html](http://www.epa.gov/owow_keep/NPS/cwact.html)



## Element a

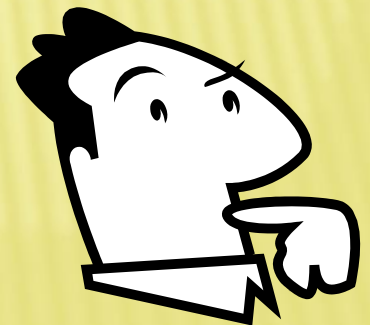
# IDENTIFICATION OF CAUSES AND SOURCES

Where are the greatest sources of the pollutant located?

When does the pollutant occur?

Can activities be identified related to the pollution?

Useful tools to answer these questions can include:  
Literature review, developing a sampling and monitoring program, and modeling.



## Element a

# IDENTIFICATION OF CAUSES AND SOURCES

The Elephant Butte Irrigation District began a monitoring program in 2008 that consists of sampling the main stem of the Rio Grande, agricultural drains return flows, and stormwater sampling.

This effort is still ongoing.





## Element a

# IDENTIFICATION OF CAUSES AND SOURCES

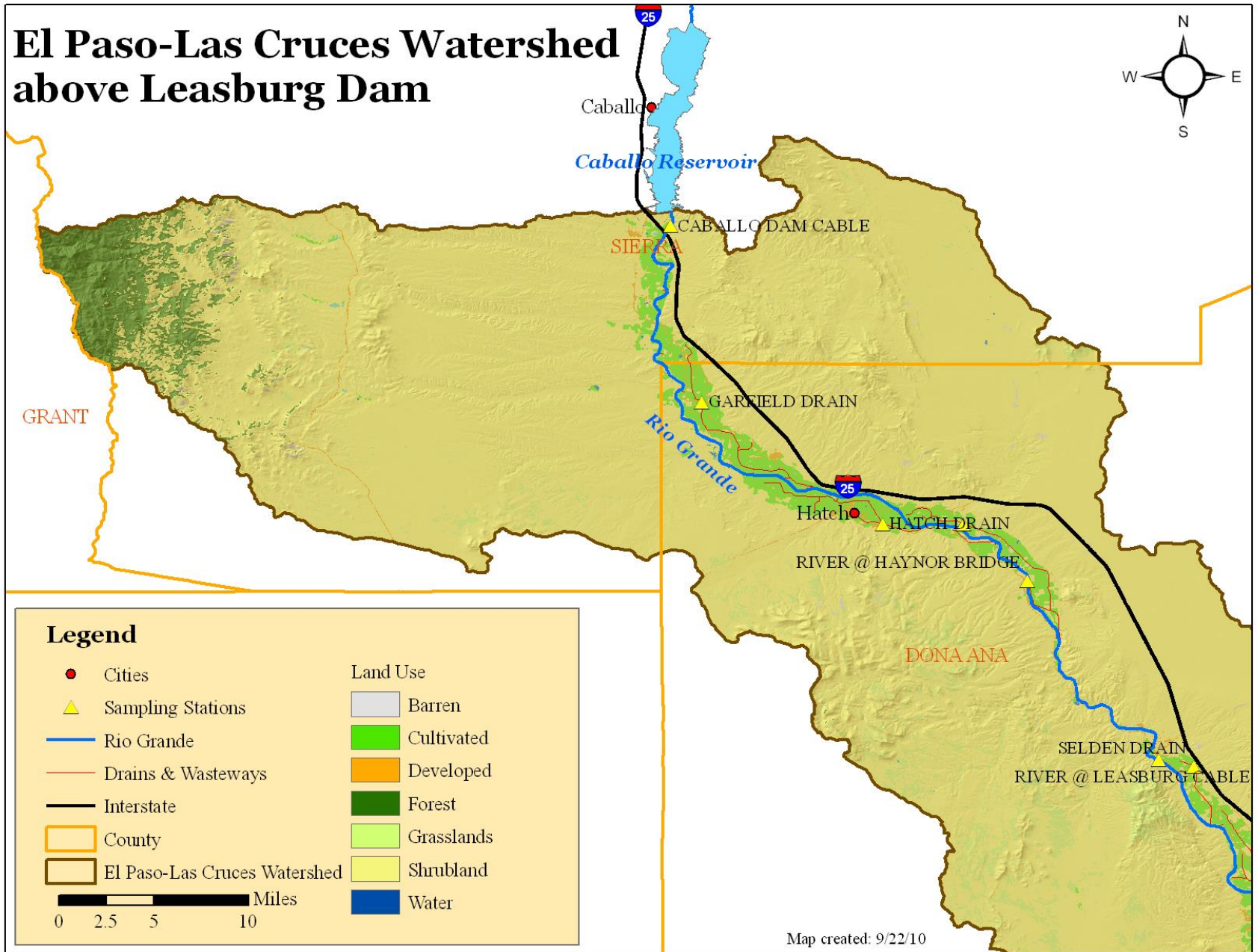
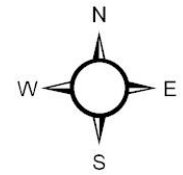
## Monitoring Program Goals

Monitor the main stem for exceedances.

Identify trends: spatial, temporal, flow conditions, stormwater.

In 2010, a goal was added to identify “hotspots” to be selected for further analysis (microbial source tracking).

# El Paso-Las Cruces Watershed above Leasburg Dam



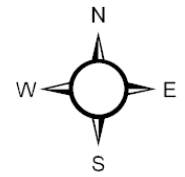
## Legend

- |                                |              |
|--------------------------------|--------------|
| ● Cities                       | Land Use     |
| ▲ Sampling Stations            | ■ Barren     |
| — Rio Grande                   | ■ Cultivated |
| — Drains & Wasteways           | ■ Developed  |
| — Interstate                   | ■ Forest     |
| — County                       | ■ Grasslands |
| — El Paso-Las Cruces Watershed | ■ Shrubland  |
| 0 2.5 5 10 Miles               | ■ Water      |

Map created: 9/22/10



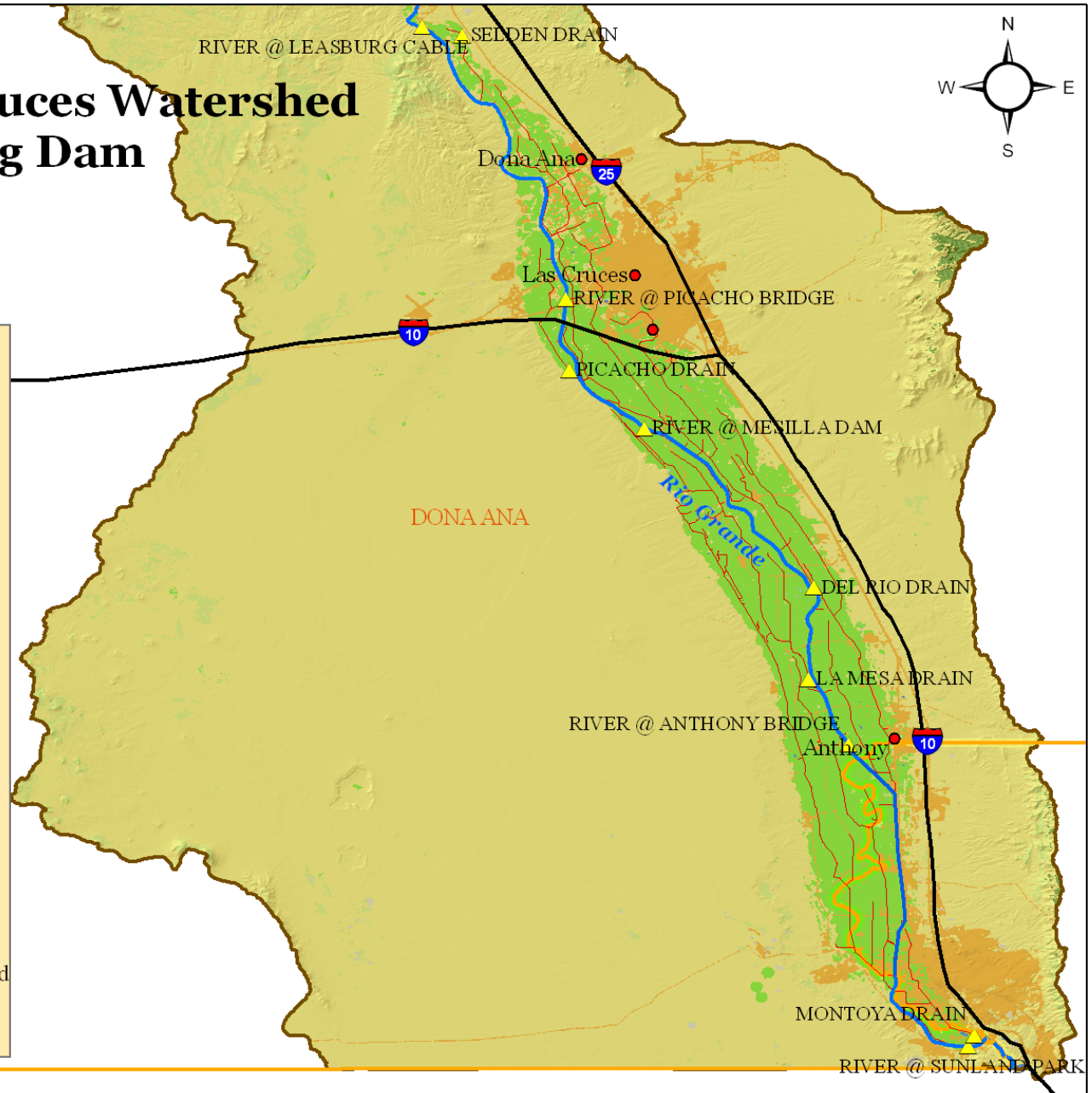
# El Paso-Las Cruces Watershed below Leasburg Dam



## Legend

### Land Use

- Barren
  - Cultivated
  - Developed
  - Forest
  - Grasslands
  - Shrubland
  - Water
  - Wetlands
  - Cities
  - Sampling Stations
  - Rio Grande
  - Drains & Wasteways
  - Interstates
  - County
  - El Paso-Las Cruces Watershed
- Miles  
 0    2.5    5    10



# 2008 *E. coli* Monitoring

Primarily focused on sampling stormwater runoff above Leasburg during the monsoon season.

Revealed *E. coli* concentrations ranging from 400 cfu/100mL to 560,000 cfu/100mL.

Although these high concentrations led to elevated levels in the river they were not as high as those observed in the tributaries.

Haynor Bridge sample was 900 cfu/100mL on 7/9/2008.

Leasburg Cable sample was 700/cfu 100mL on 7/10/2008.



# 2008 *E. coli* Monitoring

Routine mainstem sampling began in October.

Samples were collected on October 2, 29, 30, and December 22 (three sampling events).

All samples were below the criteria of 410 cfu/100mL in a single sample.

*E. coli* concentrations ranged from <1 cfu/100mL (Caballo Dam) to 210 cfu/100mL (Sunland Park).

# 2008 *E. coli* Monitoring

The limited sampling indicated that stormwater runoff could play a significant role in increasing *E. coli* concentrations above the 410 cfu/100mL standard.

Only the Mesquite drain was sampled. This sampling occurred on October 10 at four locations and revealed elevated levels and ranged from 200 cfu/100mL to 1200 cfu/100mL.

No clear patterns or trends could be determined from the 2008 sampling effort.



# 2009 *E. coli* Monitoring

Samples were collected monthly at 7 river sites: Caballo Dam Cable, Haynor Bridge, Leasburg Cable, Picacho Bridge, Mesilla Dam, Anthony 225 Bridge, and Sunland Park Bridge.

Quarterly sampling of 8 drains began in March: Hatch drain, Rincon drain, Del Rio drain, La Mesa drain, East drain, Anthony drain, NewMexico drain, and West drain.

Opportunistic stormwater sampling was also conducted.

# 2009 *E. coli* Monitoring

One sample from Haynor Bridge exceeded 410 cfu/100mL with 630 cfu/100mL on 7/29/09 (storm related).

Three samples from Anthony exceeded the single sample criterion: 710 cfu/100mL on 5/29/09, 510 cfu/100mL on 6/30/09, and 430 cfu/100mL on 8/27/09 (non-storm related).

All other stations remained below 410 cfu/100 mL although the Caballo Dam Cable site had one 400 cfu/100mL (12/21/09), and Anthony had one 400 cfu/100mL (9/30/09).



# 2009 *E. coli* Monitoring

Stormwater sampling in May and September continued to show elevated levels of *E. coli* entering the system during thunderstorm runoff events.

High *E. coli* concentrations entering the Rio Grande from Broad Canyon in May decreased rapidly in just a few miles.

Drain sampling revealed extremely high *E. coli* concentrations in June and September, especially in the southern drains. These elevated levels do not appear to be associated with stormwater runoff.

# 2010 *E. coli* Monitoring

Samples were collected monthly at 7 river sites: Caballo Dam Cable, Haynor Bridge, Leasburg Cable, Picacho Bridge, Mesilla Dam, Anthony 225 Bridge, and Sunland Park Bridge.

Quarterly drain sampling was discontinued. Previously unsampled drains were sampled: Garfield, Seldon, Picacho, and Montoya, drains. More intense sampling occurred in East drain and Mesquite drain.

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Opportunistic stormwater sampling continued.



# 2010 *E. coli* Monitoring

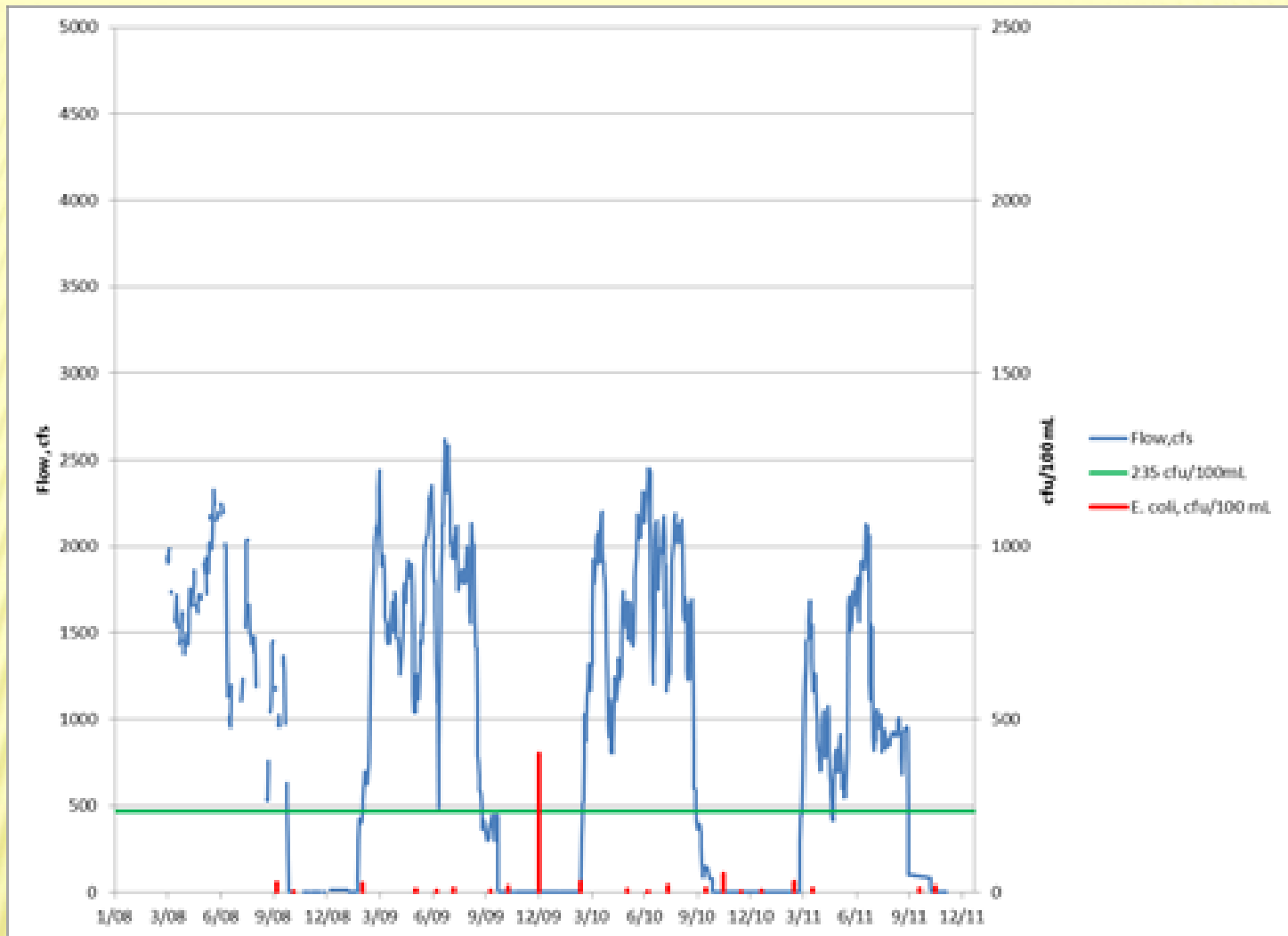
Two storm events occurred which led to elevated *E. coli* levels.

A storm on July 12 resulted in elevated *E. coli* levels upstream of Las Cruces reaching as high as 24,000 cfu/100mL at Leasburg.

A storm on July 26 resulted in elevated *E. coli* levels throughout the system ranging from 800 cfu/100mL at Mesilla Dam to 2,300 cfu 100/mL at Leasburg.

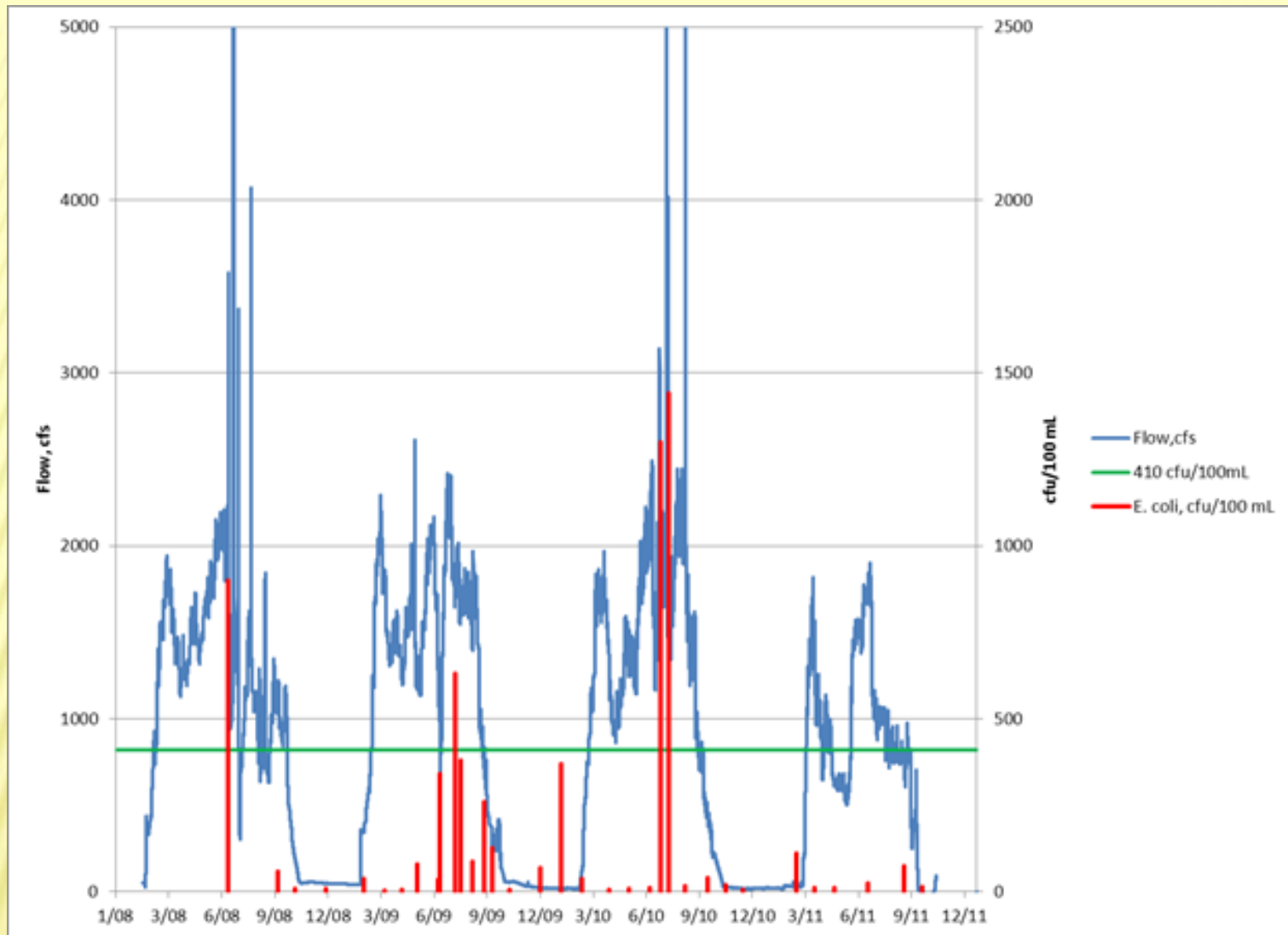
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Anthony had the only non-storm related exceedance at 470 cfu/100mL in March.

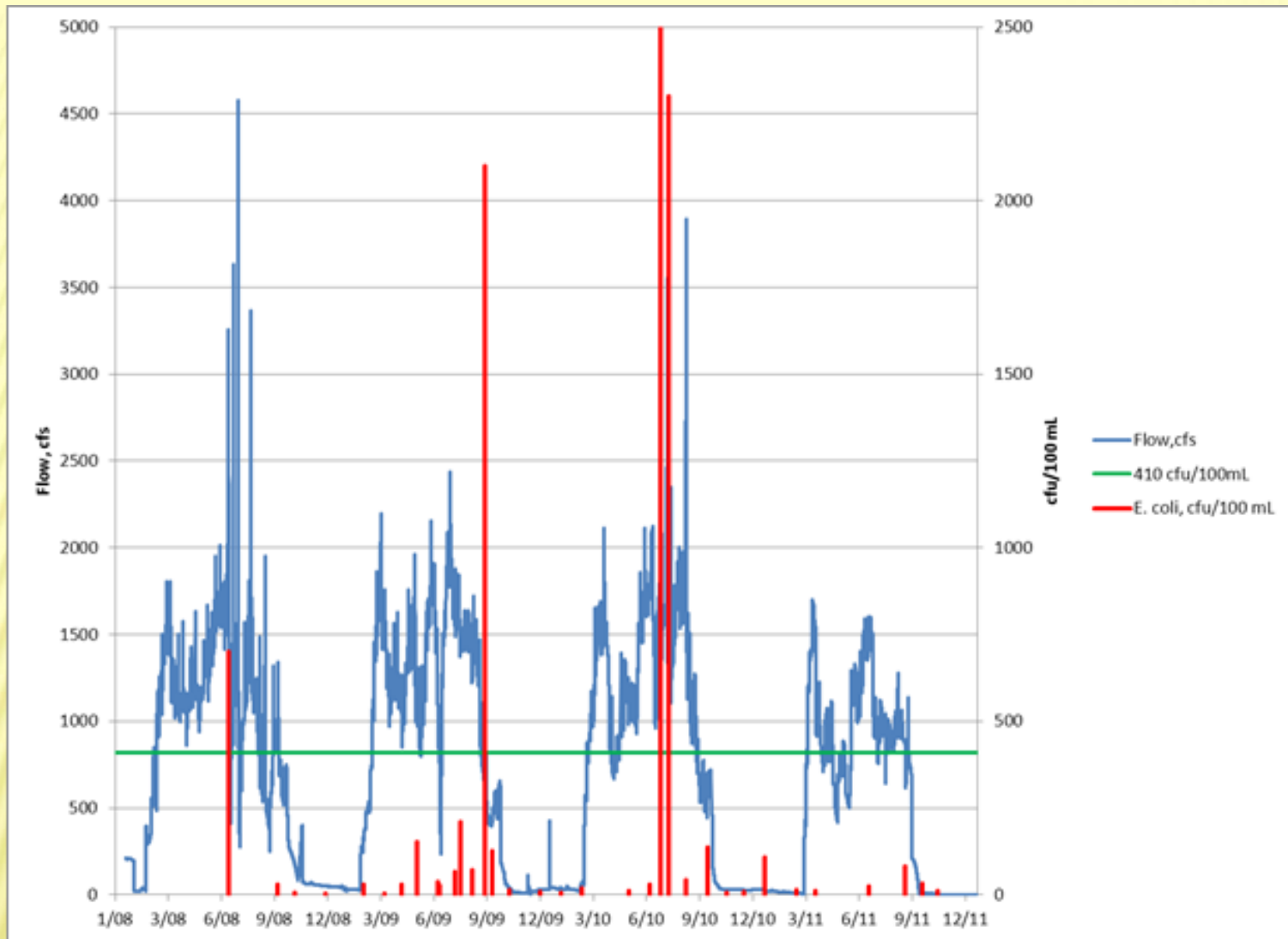


Flow and *E. coli* sampling results for the Rio Grande below Caballo Lake @ cableway.

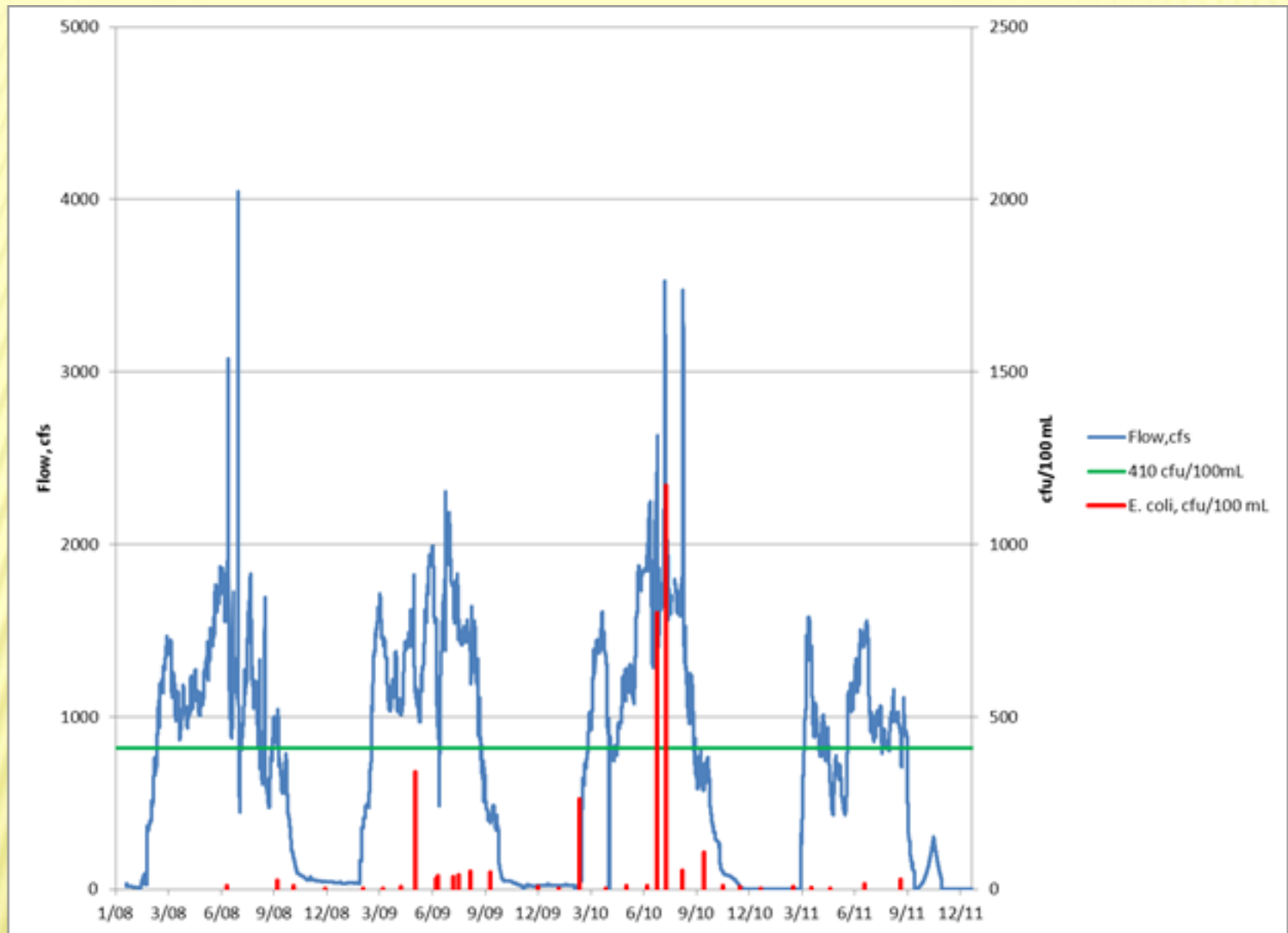




Flow and *E. coli* sampling results for the Rio Grande at Hayner Bridge.

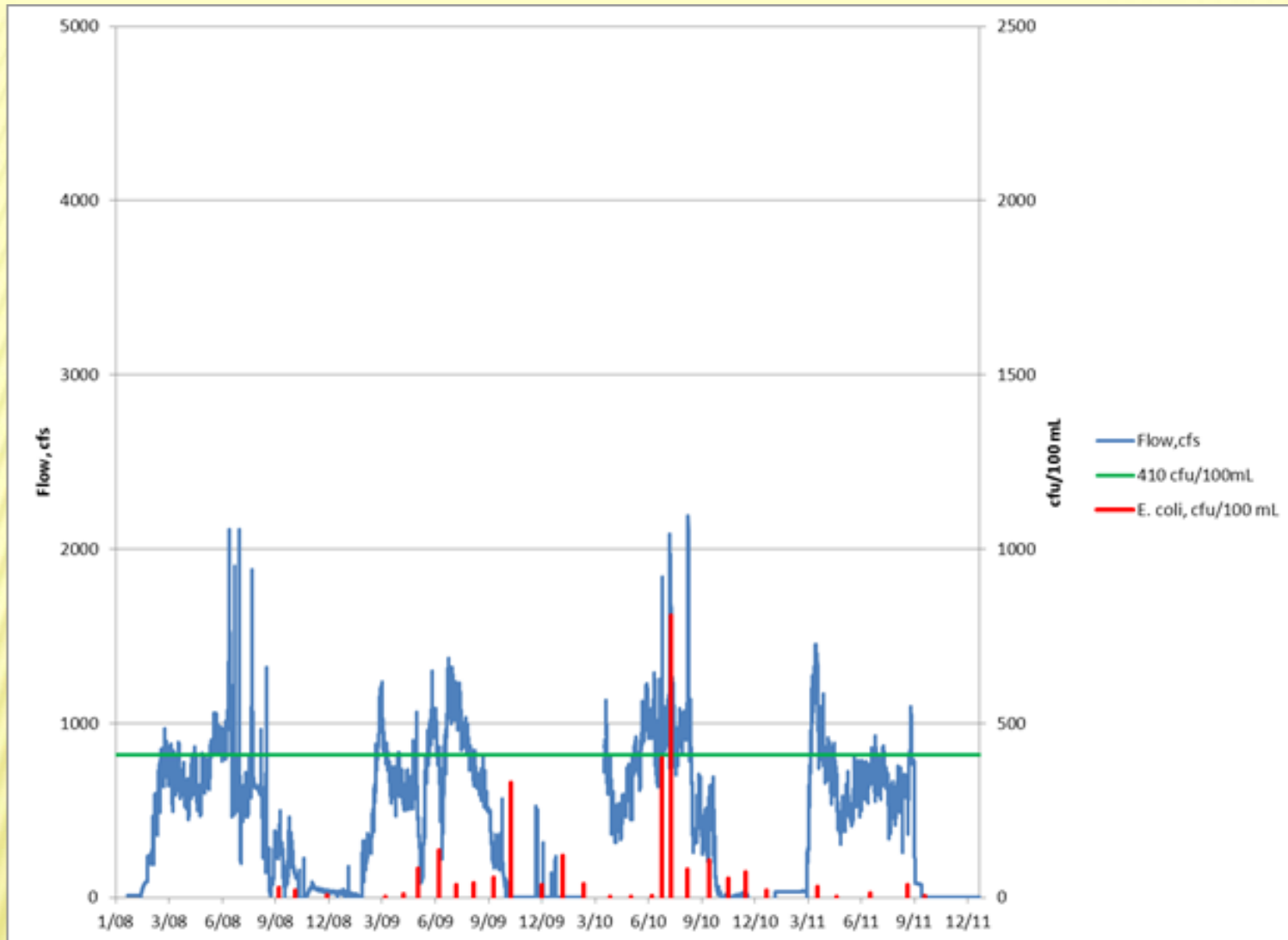


Flow and results of *E. coli* sampling at the Rio Grande below Leasburg Dam.

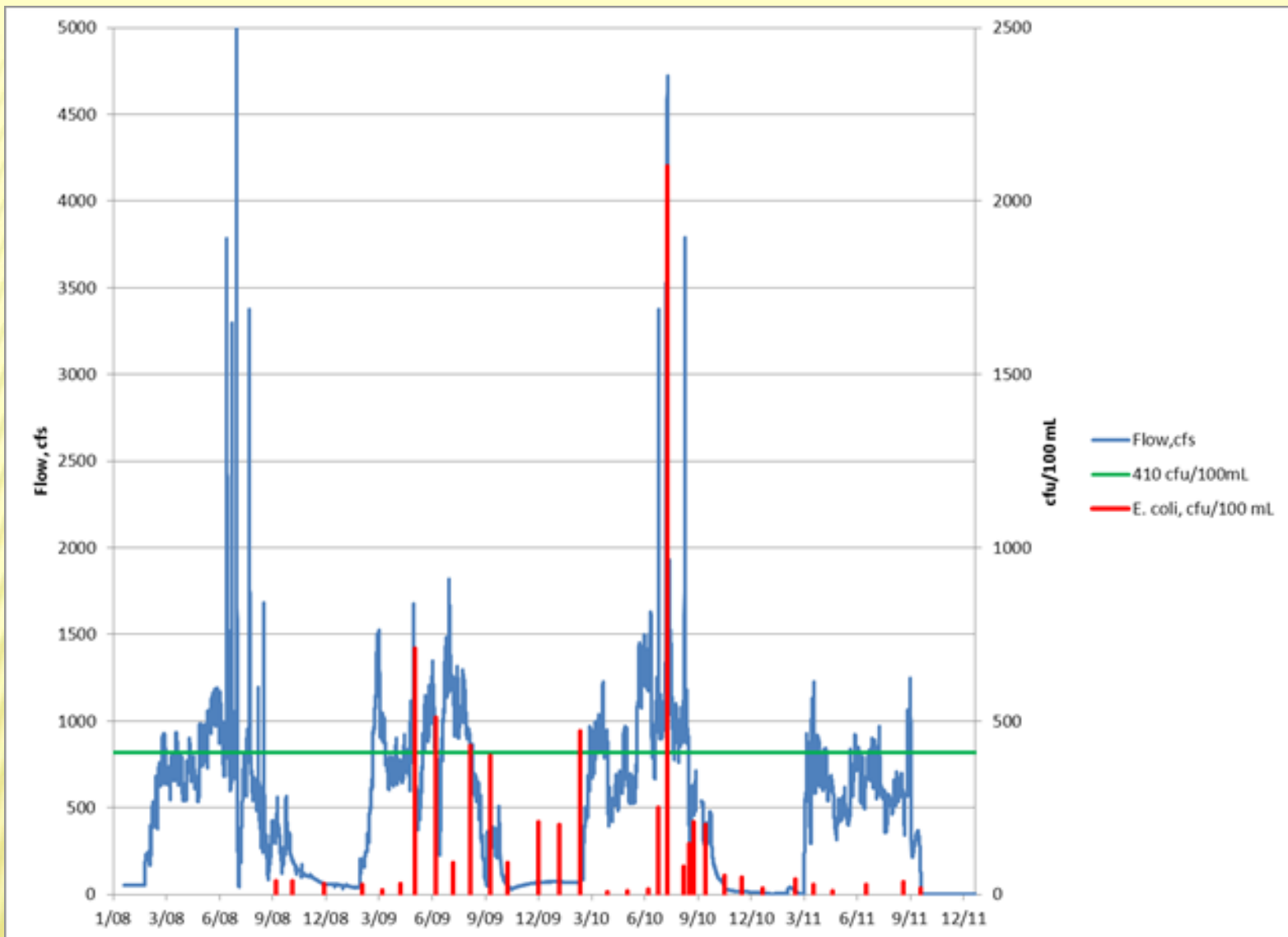


Flow and results of *E. coli* sampling at the Rio Grande above Picacho Bridge.

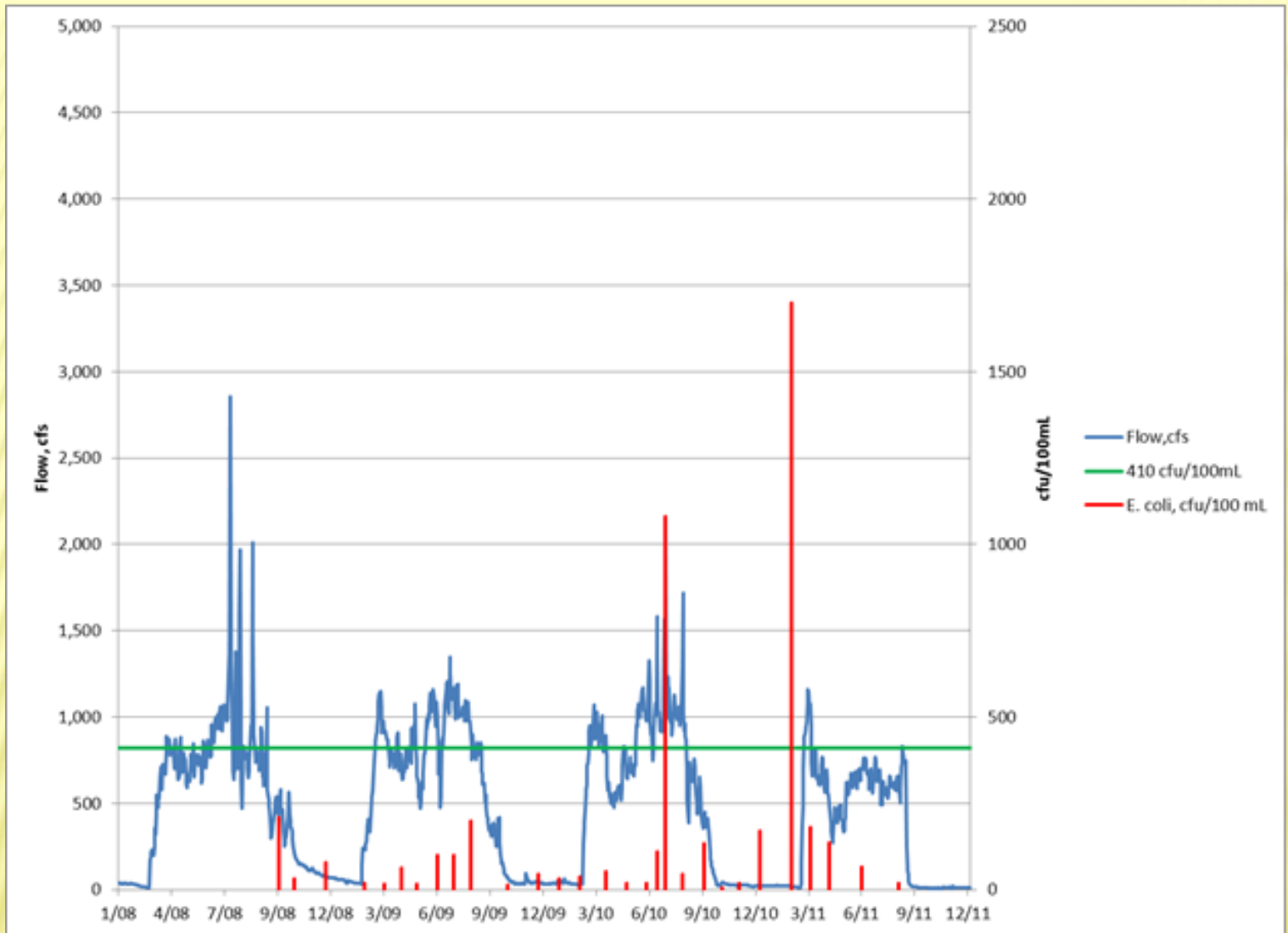




Flow and results of *E. coli* sampling at the Rio Grande below Mesilla dam.



Flow and results of *E. coli* sampling at the Rio Grande at Anthony Bridge.



Flow and results of *E. coli* sampling at the Rio Grande at Sunland Park.



# 2010 *E. coli* Monitoring

The northern drains continued to have *E. coli* concentrations below the standard.

The southern drains continued to show elevated concentrations of *E. coli* unrelated to stormwater runoff.

Mesquite drain and East drain appear to be problem areas. East drain typically had *E. coli* concentrations higher than the other drains.

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# Preliminary Conclusions.

From January 2009-December 2010 only 8% of the samples exceeded the 410 cfu/100mL criterion for *E. coli* (14 out of 166 samples).

Out of those 14 samples 9 were directly related to stormwater runoff events.

Anthony Bridge sampling revealed a pattern of elevated *E. coli* concentrations unrelated to stormwater runoff.

Some drains contain high concentrations of *E. coli*.

# Microbial Source Tracking.

A microbial source tracking study began in the fall of 2010 to determine the source host organism at select sites.

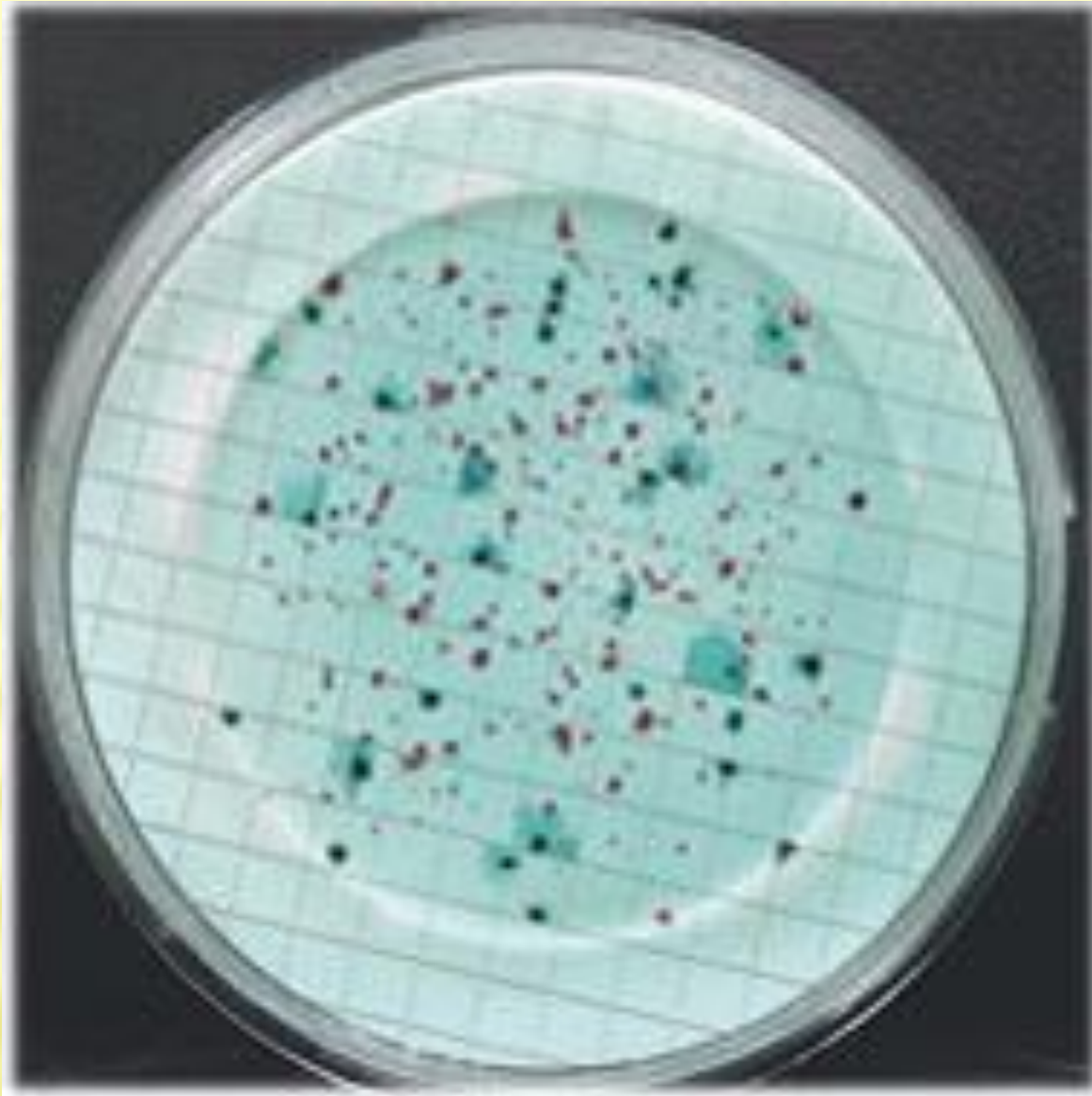
Source tracking samples were collected at the Anthony Bridge site and East drain.

Two additional source tracking sites were chosen. They were located at Leasburg cable and Sunland Park below the WWTP outfall.

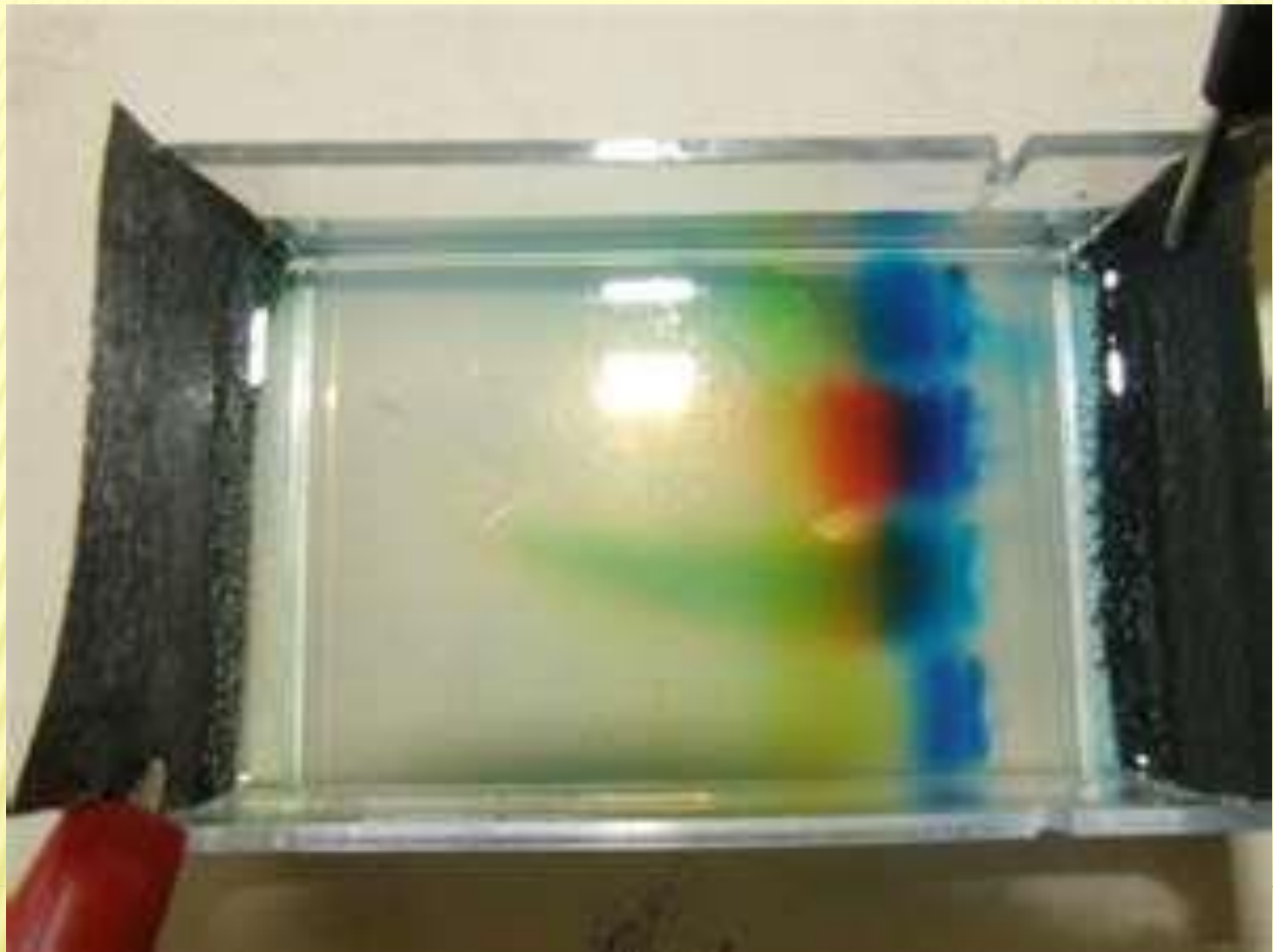


# **SAMPLING AND PROCESSING FOR SOURCE TRACKING**

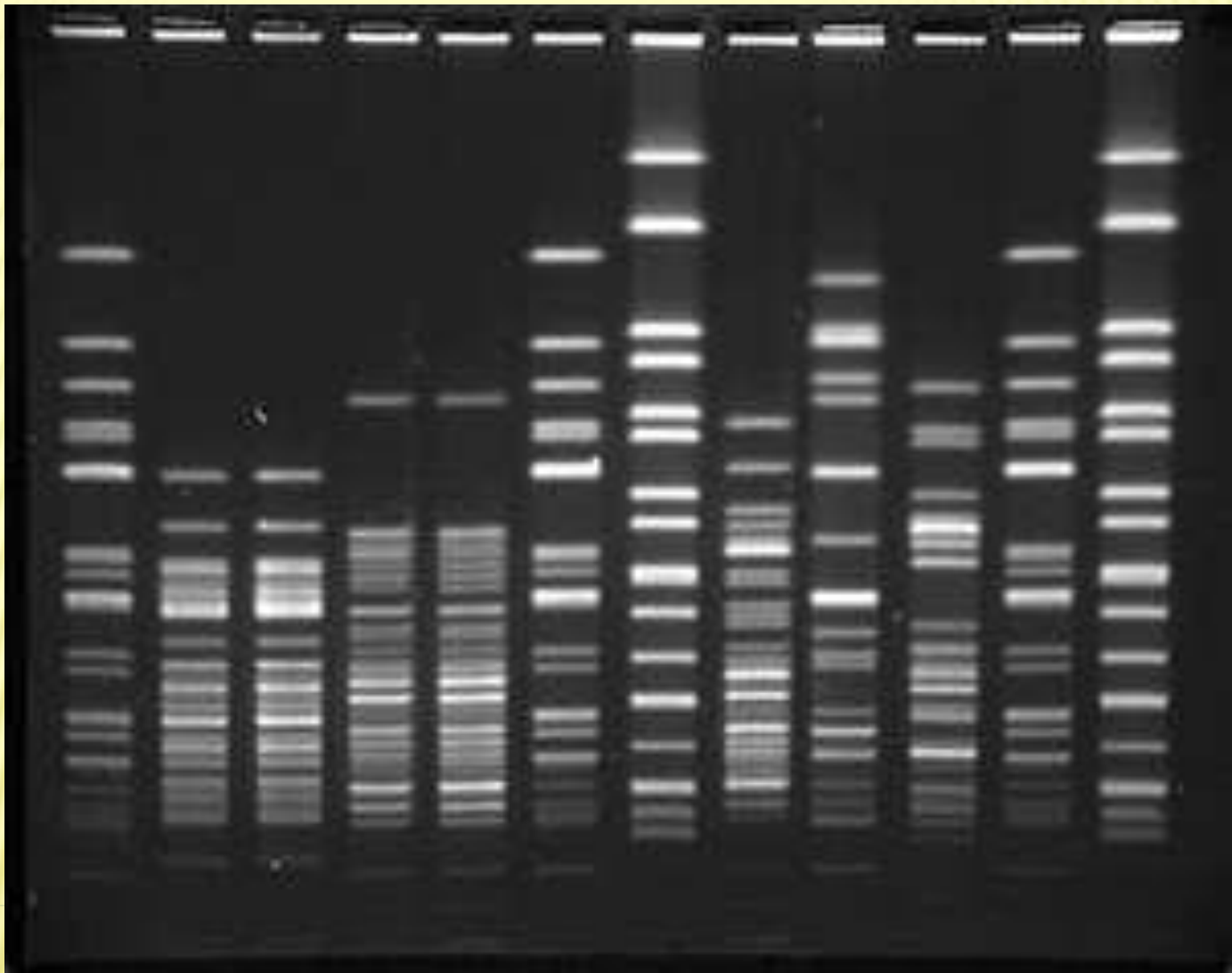
- Triplicate samples were collected.
  - Samples were analyzed with the m-Colibblue 24 method.
  - Filters were held for up to 5 days then shipped to lab.
  - *E. coli* DNA is then extracted using Pulsed Field Gel Electrophoresis.
  - Results are then compared with genetic library reference DNA.
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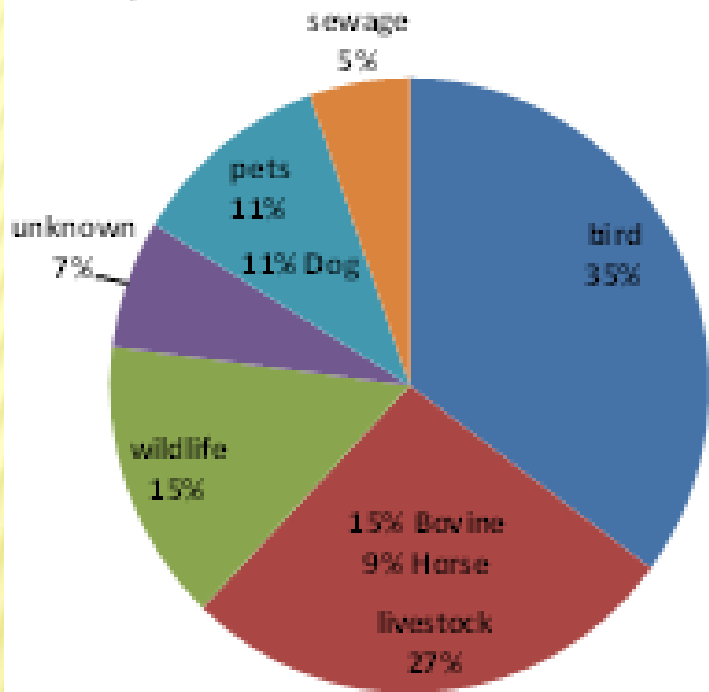
M-Coliblu24 plate.





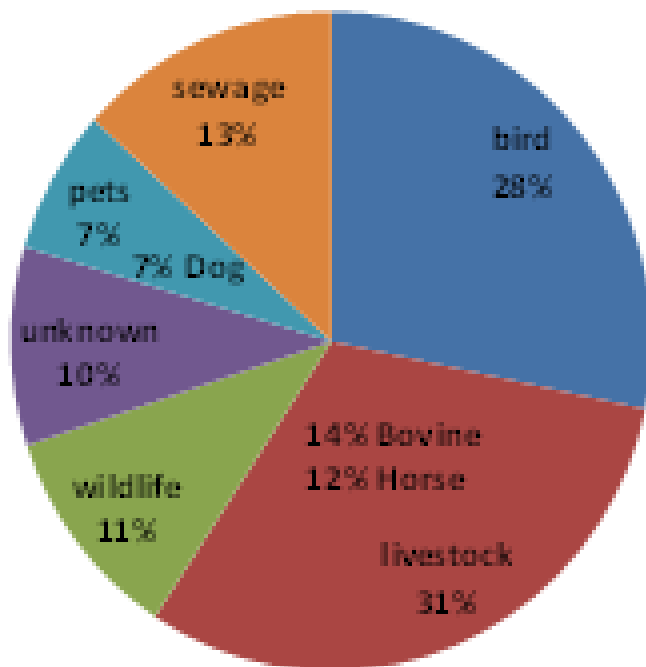


RioGrande  
Anthony



Anthony, n= 74	%
bird	35.1
livestock	27.0
wildlife	14.9
unknown	6.8
pets	10.8
sewage	5.4

### East Drain

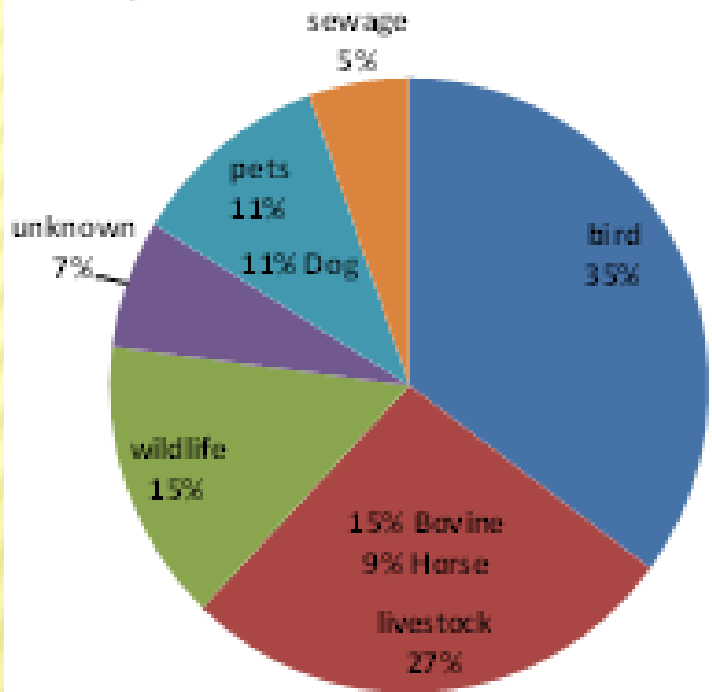


East Drain, n = 113 %

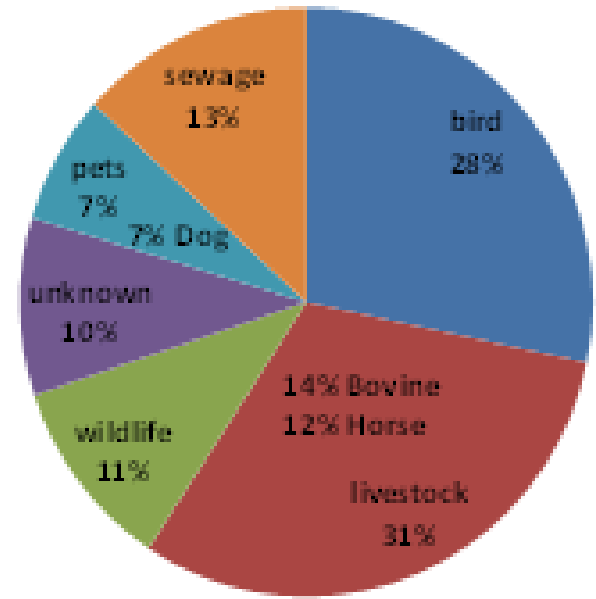
bird	28.3
livestock	31.0
wildlife	10.6
unknown	9.7
pets	7.1
sewage	13.3



RioGrande  
Anthony



East Drain



# Additional Sampling Efforts.

A concurrent study was focused on *E. coli* above and below the Sunland Park WWTP.

NMED began collecting *E. coli* samples in April 2011 in the River and at all permitted discharges from Elephant Butte Dam downstream. An additional station was added for this effort at Corchesne. Sampling continued through March 2012.

# Conclusions

Impairment from *E. coli* is highly associated with stormwater runoff over much of the watershed.

The exception occurs at the bottom of the reach in the vicinity of Anthony and Sunland Park.

The project demonstrated that drains at the bottom of the watershed are a contributing factor to the *E. coli* problem.

A portion of this may also have been related to the Vado and Sunland Park WWTP.



# Potential Management Practices

## Addressing Stormwater-

- Retention structures
- Upland and in-drainage restoration
- Utilizing existing agricultural infrastructure
- LID/Green Infrastructure
- Outreach

# Potential Management Practices

Addressing Chronic (non-stormwater) areas

Upgrading WWTP including collection systems

Assessing manure management practices

Assessing potential illegal discharges

Outreach

# Current Efforts.

- Data Analysis is complete.
- Partial draft of the watershed plan has been prepared.
- Some of the plan elements remain incomplete.
- Working draft to be ready February 2013
- Reviewed by stakeholders spring 2013.
- Final draft completed by June 2013.



**Questions/Comments**

**Discussion**