

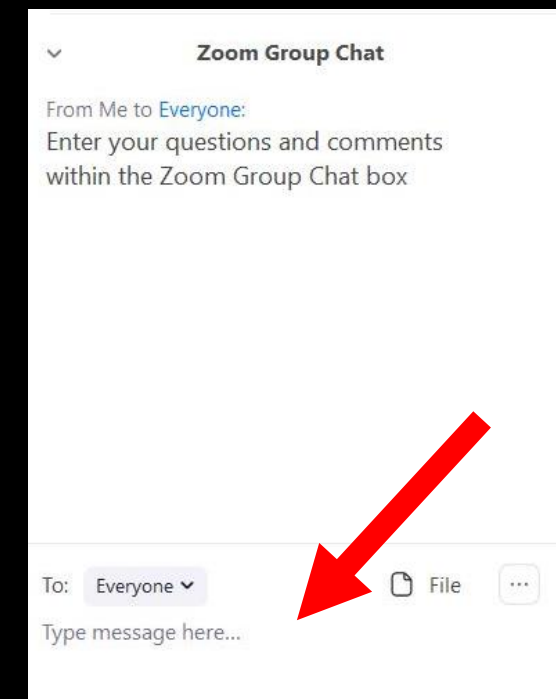
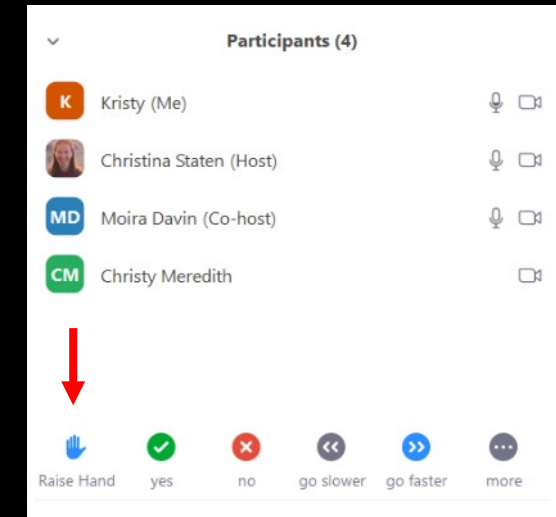
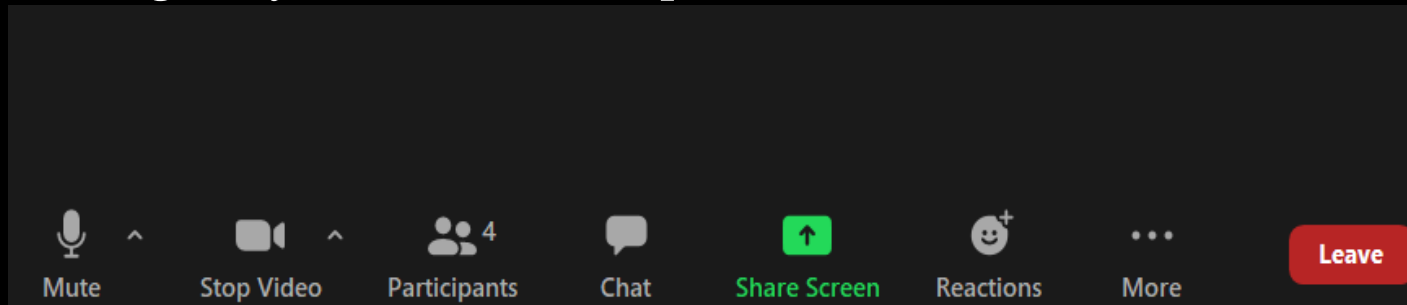
# Red Rock Metals, Sediment, and *E.coli* TMDLs

Christy Meredith, Lou Volpe

August 10, 2021

# Meeting Expectations

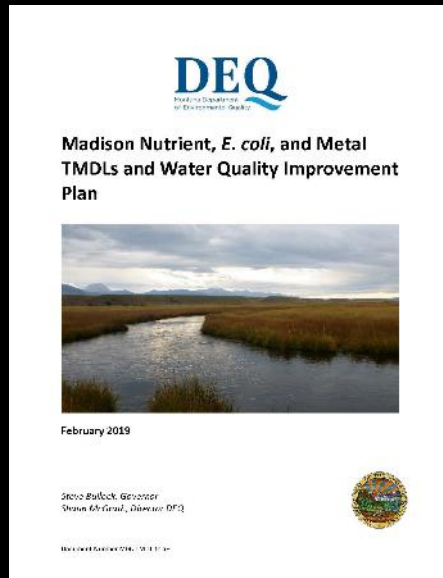
- Presentation: approximately 40 minutes
- 5 minute presentation by Zach Owen, Beaverhead Watershed Committee
- Question & Answer Session: At end of presentation
  - Unmute and ask your question
- Enter questions in the chat box at any time
  - Reference presentation slide number
- Video/camera is optional
- Turning off your video feed provides better bandwidth





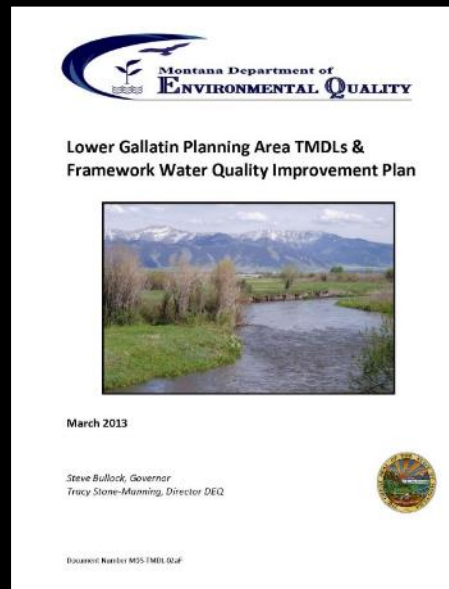
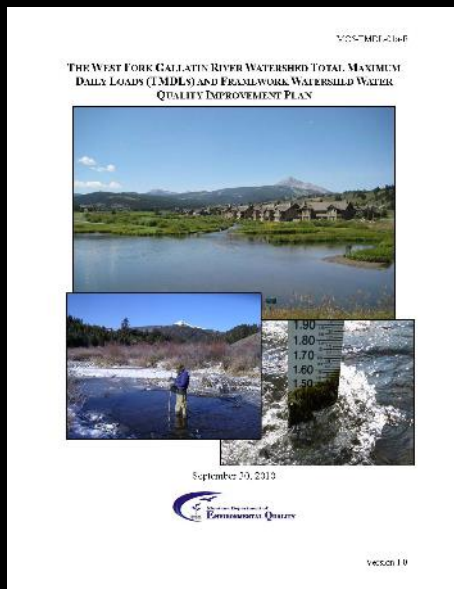
# Who We Are

- Mission of maintaining and improving water health so that it:
  - Supports recreational enjoyment (fishing, swimming, boating, scenic views)
  - Provides clean drinking water for humans and livestock
  - Supports aquatic life (fish and bugs)
  - Is useable for irrigation
- Develop solutions to reduce pollution
- Provide support to local organizations working to improve water quality (stream and lake health)



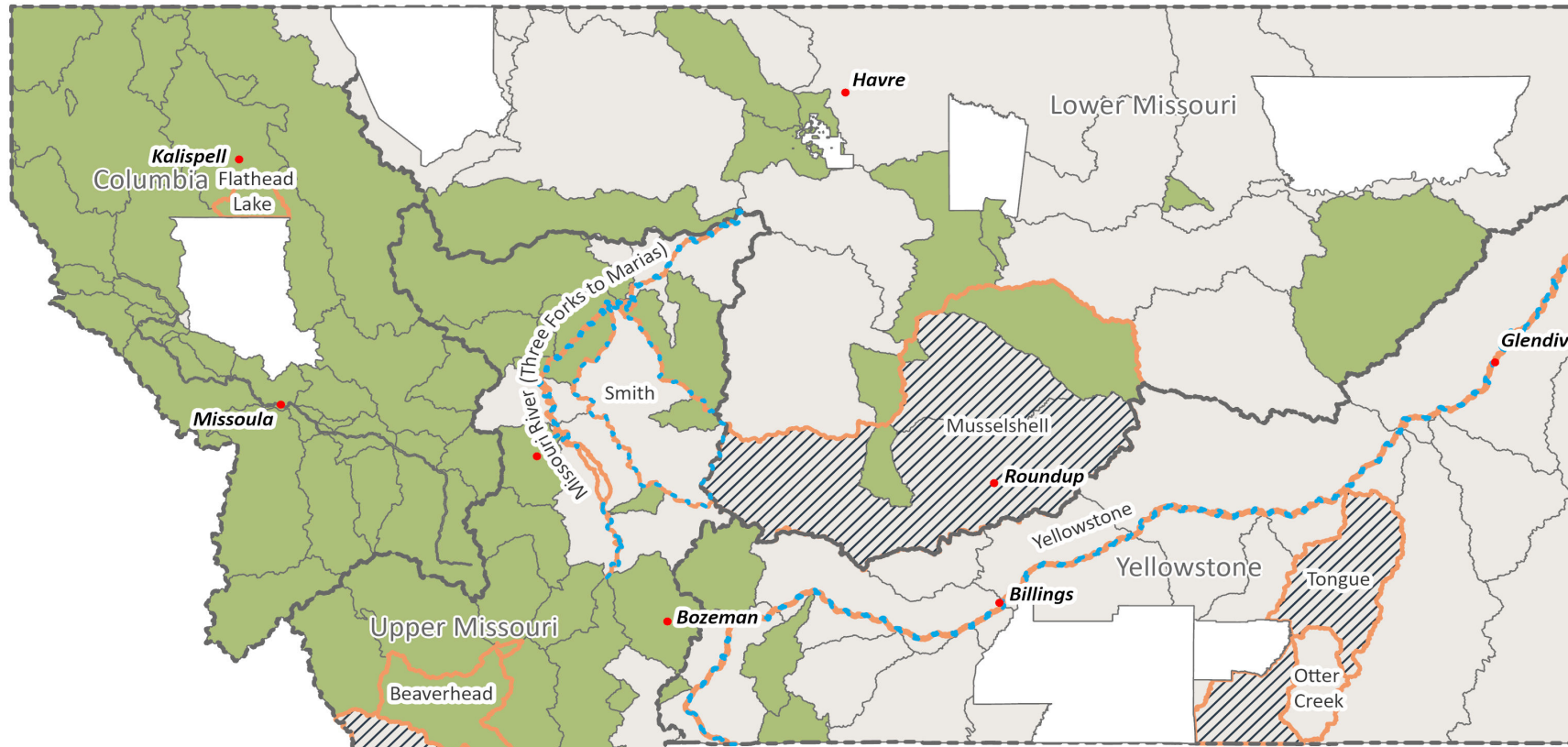
# Project Purpose: Why DEQ is Writing TMDLs

- Montana Constitution: All persons have an inalienable right to a clean and healthful environment
- Montana DEQ has delegated authority under the federal CWA (Section 303d)
  - to identify **impaired** streams, rivers, and lakes
- AND
- to develop a plan to address them
- Over 75 completed TMDL documents

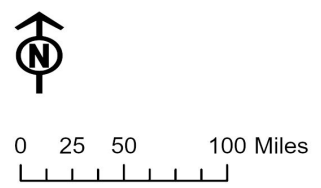




# TMDL Development Status



- TMDL Completed
- TMDL Development in Progress
- TMDL Priority Area
- Pre-TMDL Assessment
- No TMDL Activity
- Tribal Lands
- Basin



2/12/2021 - DEQ Watershed Protection Section





**Red Rock Metals, Sediment and *E. coli*  
TMDLs and Water Quality Improvement  
Plan**



July 2021

Greg Gianforte, Governor  
Chris Dorrington, Director DEQ



Document Number xxx

# Meeting Purpose

- Provide information about a total maximum daily load (TMDL) document available for a week public comment period and answer questions
- Describe a water quality study that investigated at the effects of excess metals, sediment, and *E. coli* on 22 stream segments in the Red Rock watershed: what sampling was conducted, the outcomes, and suggestions for improving stream health

## Part 1: Introductory Information

- 1.0 Project Overview
- 2.0 Red Rock River TMDL Planning Area Description
- 3.0 Montana Water Quality Standards
- 4.0 Defining TMDLs and their Components

## Part 2: TMDLs

- 5.0 Metals TMDL Components
- 6.0 Sediment TMDL Components
- 7.0 E. coli TMDL Components

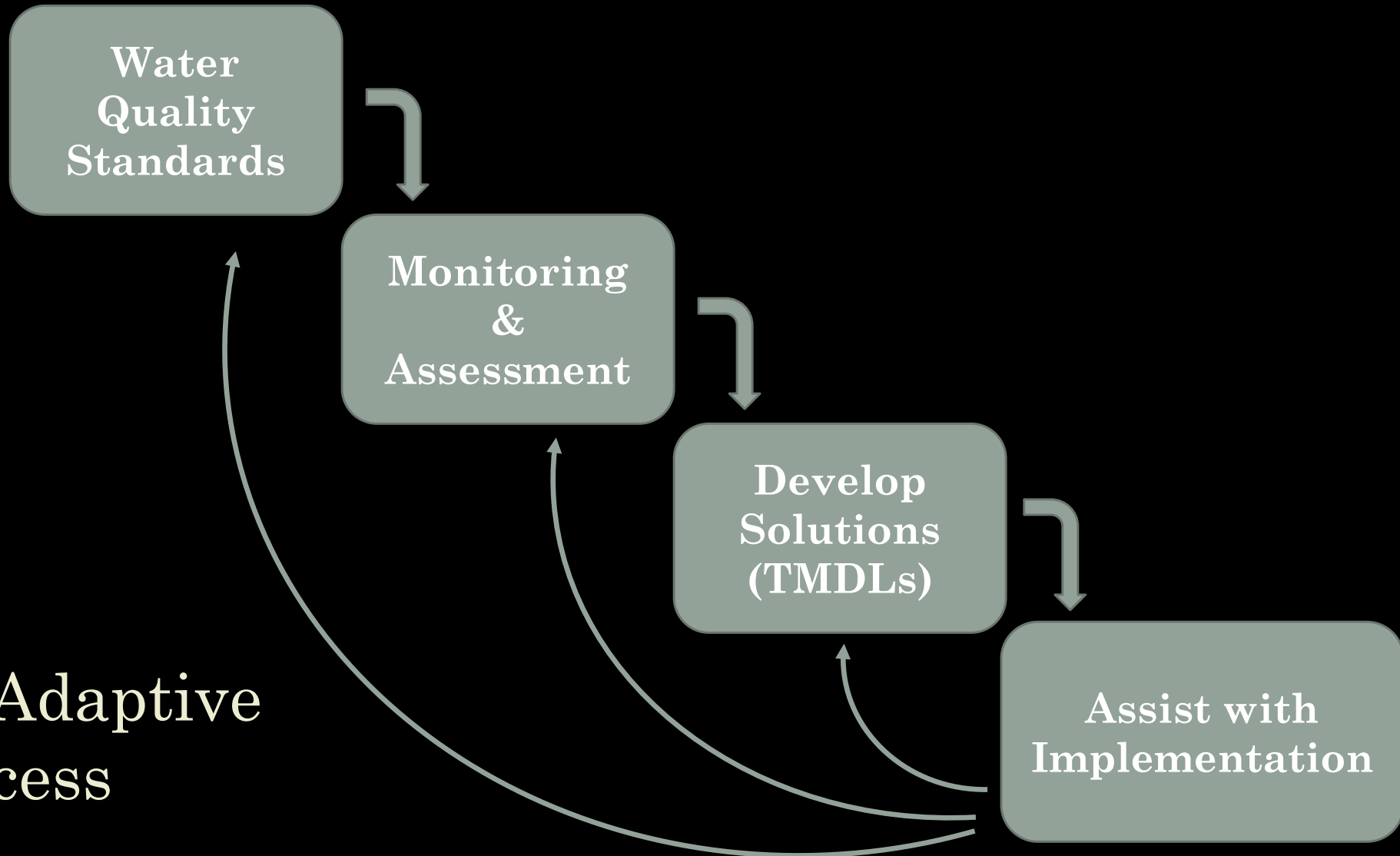
## Part 3: Water Quality Improvement Recommendations

- 8.0 Public Participation and Comments
- 9.0 Non-pollutant Impairments
- 10.0 Water Quality Improvement Plan
- 11.0 Monitoring for Effectiveness

# Contents of the TMDL Document

[https://deq.mt.gov/files/Water/WQP/B/TMDL/PDF/RedRockWS/RedRockMetals\\_Sed\\_EcoliTMDLsPublicDraft\\_7\\_28\\_21.pdf](https://deq.mt.gov/files/Water/WQP/B/TMDL/PDF/RedRockWS/RedRockMetals_Sed_EcoliTMDLsPublicDraft_7_28_21.pdf)

# DEQ's Water Quality Planning Steps



# Water Quality Standards

- Protect designated water quality uses for the Red Rock River watershed
- Numeric (numbers) or narrative (description)



Recreation



Aquatic Life



Drinking Water



Irrigation



# Water Quality Monitoring

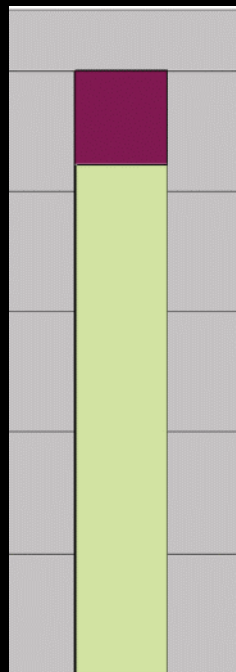
- Monitoring data is compared to the water quality standards
- If a water is not meeting a water quality standard, it is considered impaired
- Waters impaired for a pollutant require a total maximum daily load
- Information is tracked via an impaired waters list that includes the waterbody – pollutant impairment causes that require TMDL development





# TMDL

Total Maximum Daily Load is the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards



← Total Current Load

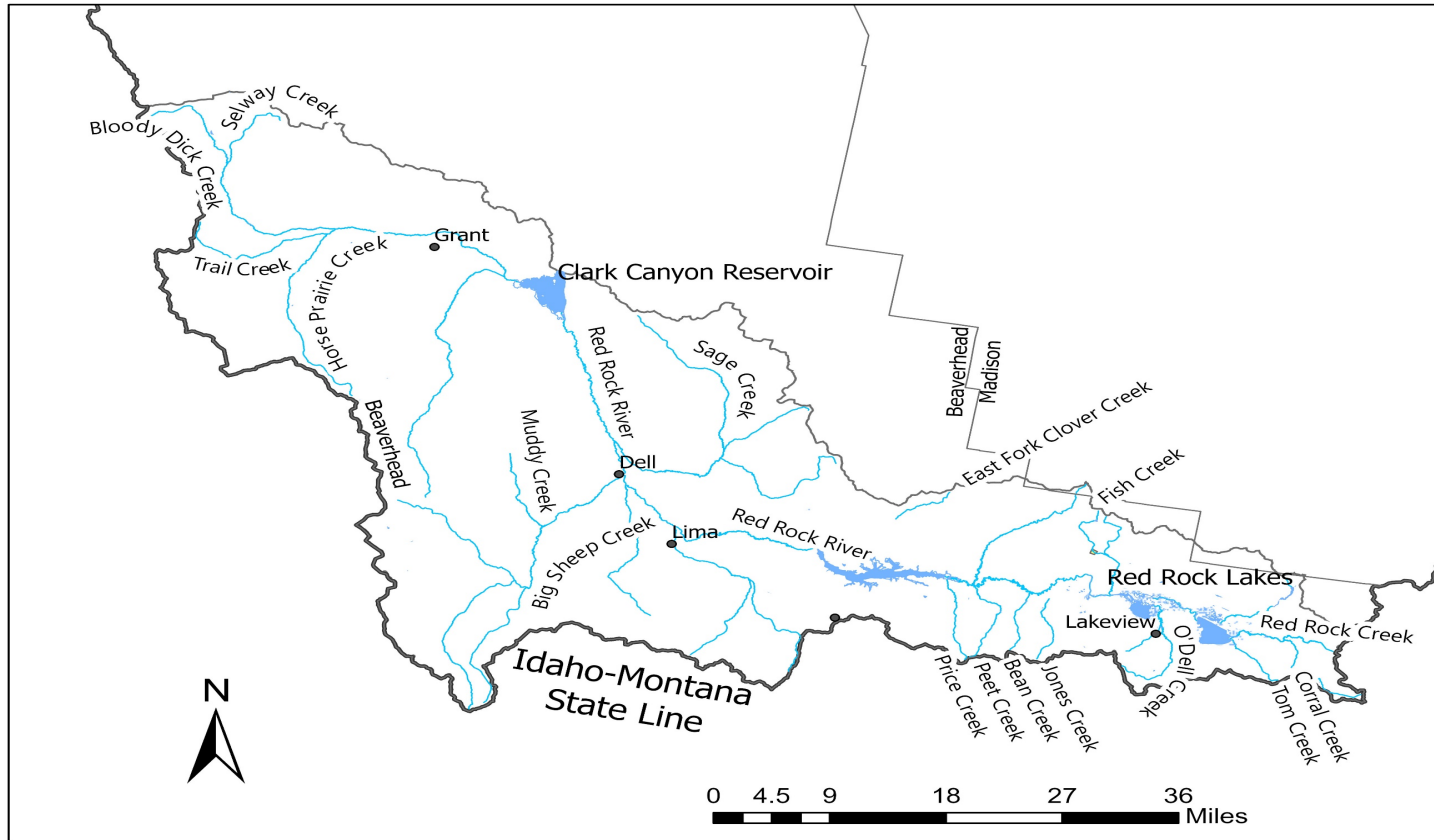
← TMDL  
(Allowable Load)

Simple TMDL:

6.8 cfs\*  
10 ug/L Arsenic \*  
0.0054 (conversion factor)  
=0.368 lbs/day



# Red Rock Watershed: Location







Hell Roaring Creek

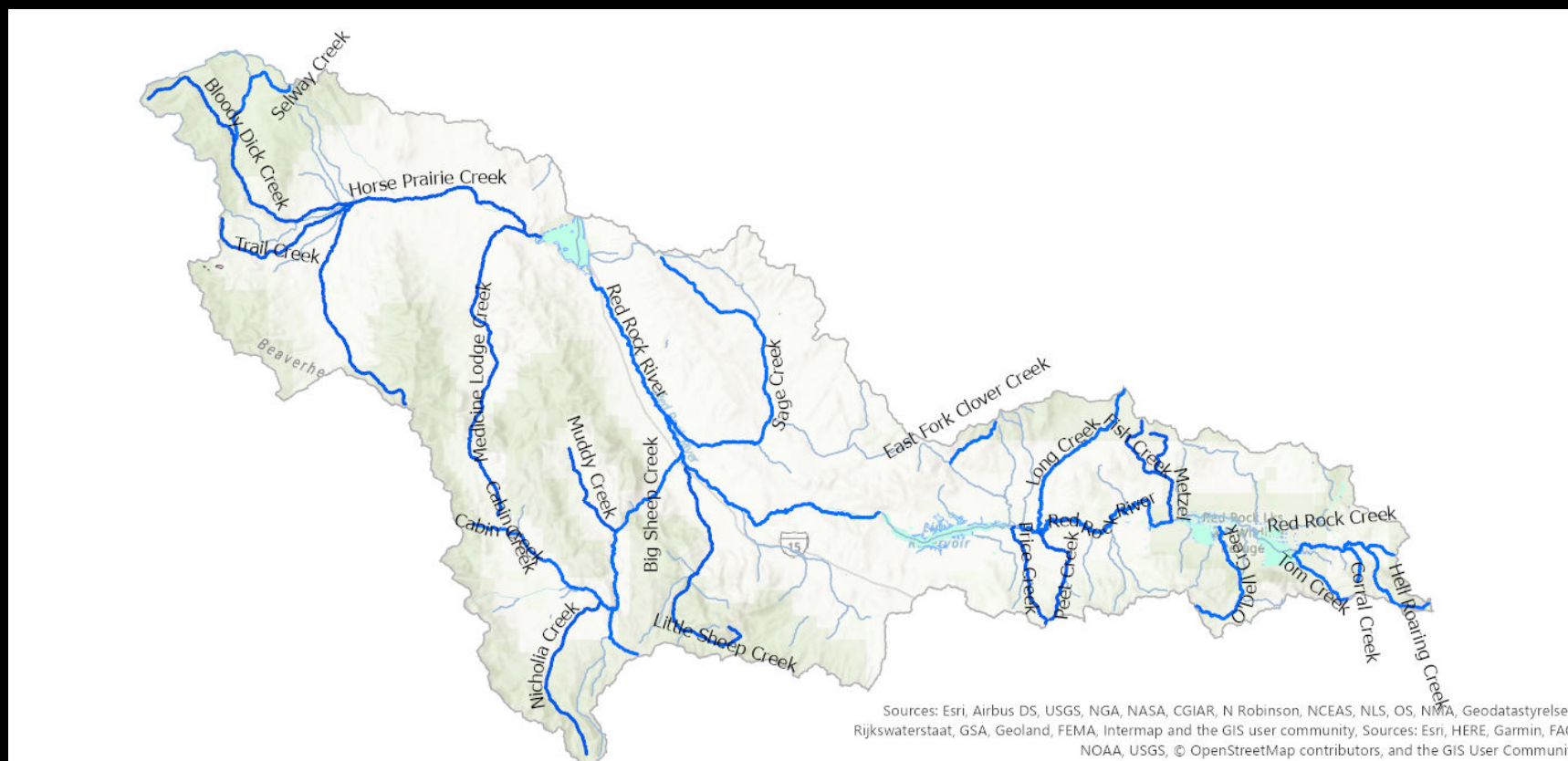
# Why the Red Rock River Watershed

- Important economic resource (fishing, tourism, ranching)
- Active local organizations with interest in protecting stream health (water quality) and implementing the recommendations in the TMDL document

# Project History



# 25 Sampled Stream Segments Assessed in the Monitoring Effort



# Outcome of Monitoring

Number of Evaluated Stream Segments Exceeding Standards:

- Metals (9/20)
- *E.coli* (4/6)
- Sediment (15/16)

Delistings:

- Lower Red Rock River (Lead, Zinc)
- Horse Prairie Creek (Arsenic, Cadmium, Copper, Lead, Zinc)

Website to find impairment information: <http://deq.mt.gov/Water/Resources/cwaic>

Search “water quality assessment information”



# Metals TMDLs



Metals can affect both human health and aquatic life including cancer, osteoporosis, and decrease in overall body functions

# How do metals get into streams?

- Metals erode from rock when exposed to air and water during mining or other earth-moving activities
- They can bind to sediment and get resuspended later during storm events

Tailings Piles



Turbid Waters-Fish Creek



# Metals TMDL Development Triggers

- If a single sample exceeds the human health standard
- If more than 10% of the samples exceed the chronic aquatic life standard
- If a single sample exceeds the acute aquatic life standard by more than a factor of two

## Waterbody Segments with Metals Listings on the 2020 Impaired Waterbodies List

Stream	Aluminum	Arsenic	Cadmium	Copper	Iron	Lead	Mercury	Selenium
Bloody Dick Creek	X					X		
Fish Creek	X							
Horse Prairie Creek*							X	
Little Sheep Creek					X			
Medicine Lodge Creek					X			
Muddy Creek		X			X			
Metzel Creek		X						
Nicholia Creek**	X							
Peet Creek	X		X	X				X
Price Creek		X						
Trail Creek	X							

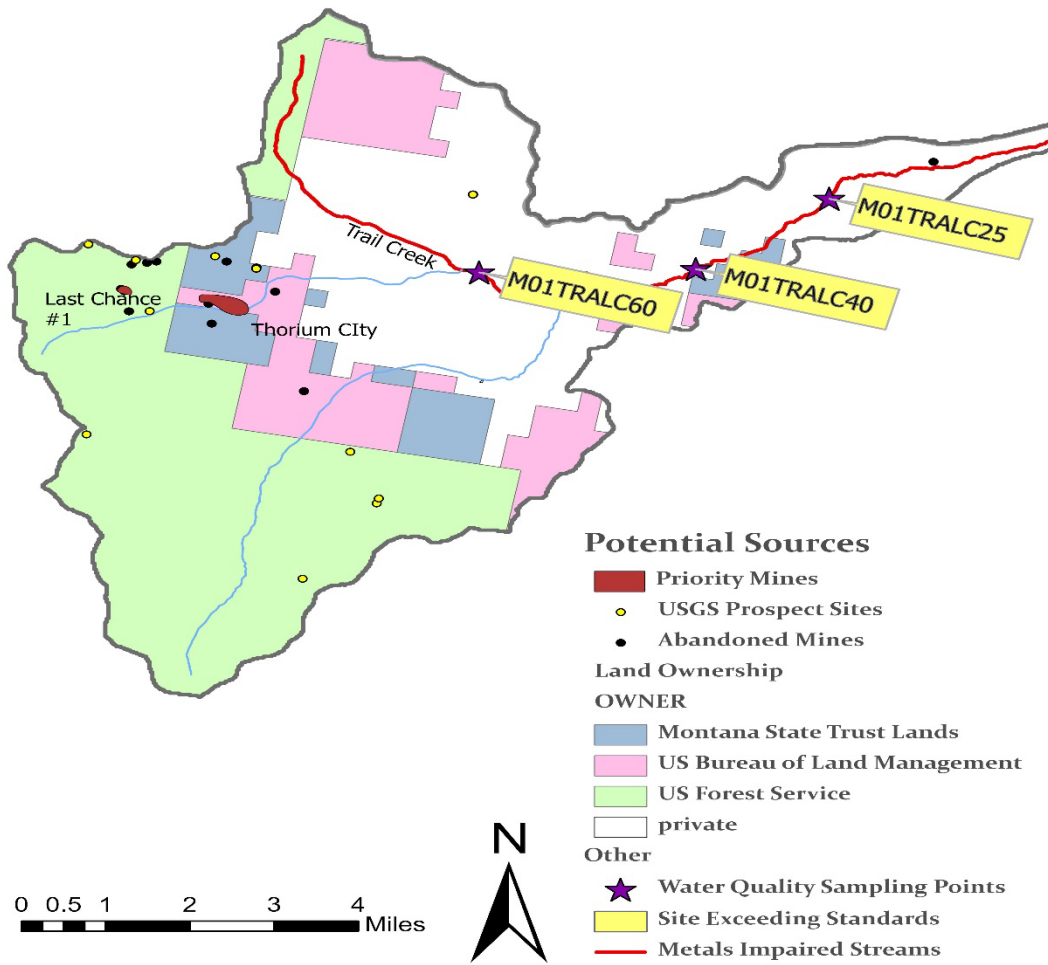
\*no TMDL in this document

\*\* listed in error; will be removed from 2022 list

Assessed but not impaired: Big Sheep Creek, Cabin Creek, Hell Roaring Creek, Long Creek, ODell Creek, Red Rock River (2 segments), Sage Creek, Red Rock Creek, Nicholia Creek



## Trail Creek Metals Sources



## Example Source Assessment: Trail Creek

- Contains 15 abandoned mine sites, including 2 priority mines
- $\geq 12$  prospecting sites
- Exceeds Aluminum standard at low and high flow
- A 22-38% percent reduction is needed to meet water quality standards for Aluminum

# Low Flows Contributed to Listings

Medicine Lodge



Price Creek



Fish Creek







# Sediment TMDLs



# Problem Studied: Sediment

- Sediment is naturally occurring
- Too much fine sediment affects fish and other aquatic life:
  - Increases turbidity
  - Blocks light causing a decline in plant growth
  - Smothers bugs and fish eggs
  - Fills pools and limits spawning habitat







**O Dell Creek**



**Peet Creek**



**Long Creek**



**Muddy Creek**

# Sources of Excess Sediment

- Eroding streambanks
- Unpaved roads without best management practices in place
- High-density livestock access to stream channels
- Lack of healthy streamside vegetation

# Sediment Water Quality Standard

No increases in sediment above naturally occurring concentrations which will or are likely to create a nuisance or harm to beneficial uses.



*Photo Credit: USGS, J Armstrong*





# Sediment Monitoring

- Amount of fine sediment in riffles and pools
- Channel form and stability
- Instream habitat (number of pools)



# Example: Sage Creek

Observed Condition



Desired Condition



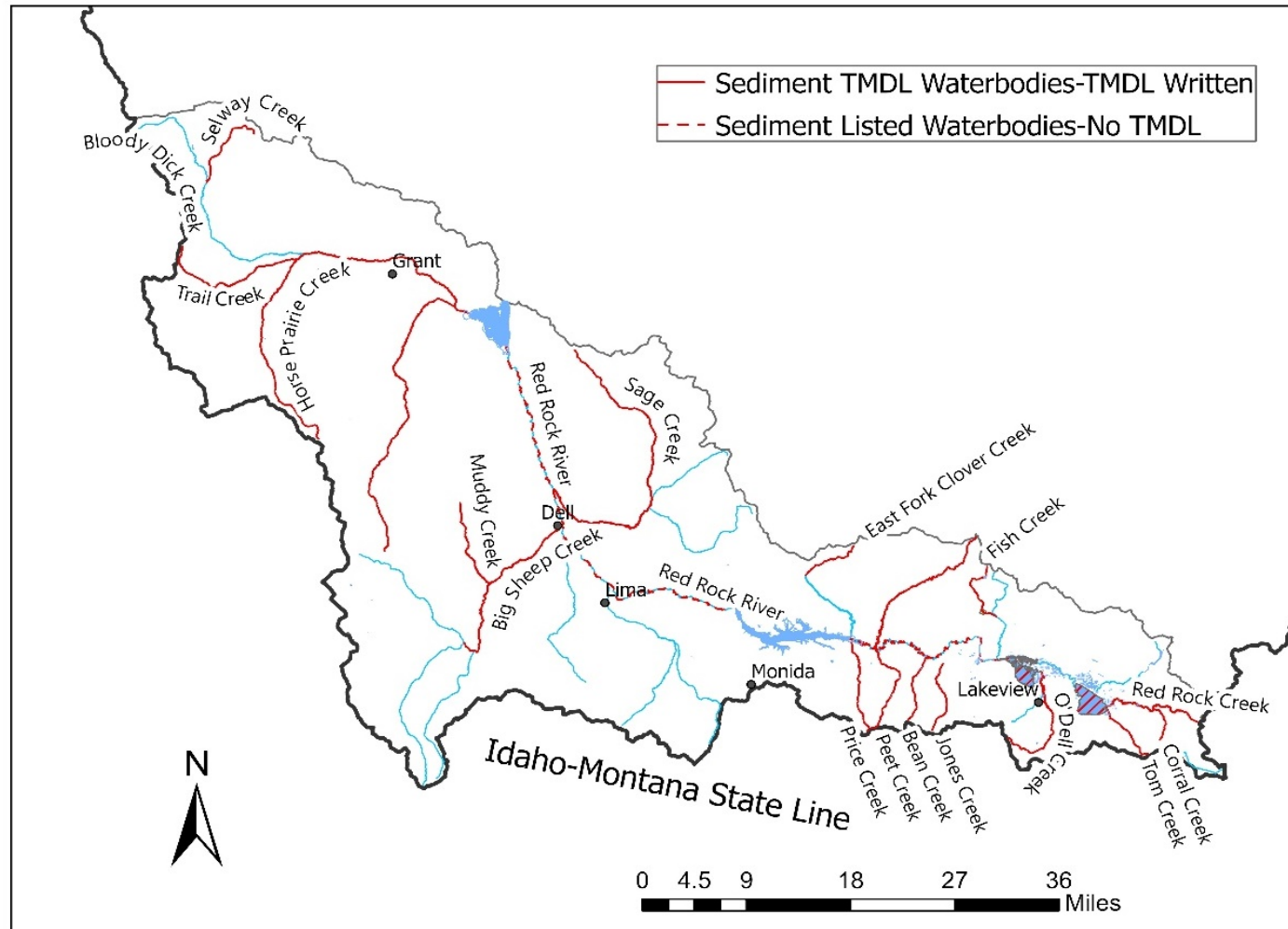
% Fine Sediment < 2 mm in Pool Tails (Where fish Spawn)

Expected: < 17%

Measured: 27.5%



## Sediment TMDLs Written



- Bean Creek
- Big Sheep Creek
- Corral Creek
- East Fork Clover Creek
- Fish Creek
- Horse Prairie Creek
- Long Creek
- Jones Creek
- Medicine Lodge Creek
- Muddy Creek
- O'Dell Creek
- Peet Creek
- Price Creek
- Sage Creek
- Red Rock Creek
- Selway Creek
- Tom Creek
- Trail Creek

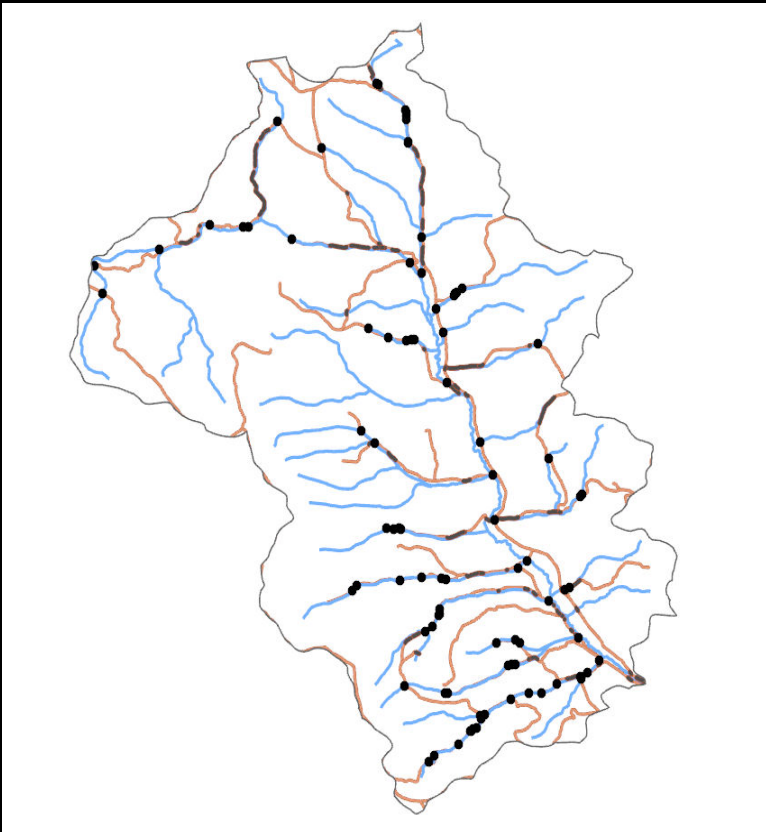
Evaluated,  
but no TMDL Written

- Bloody Dick Creek



# Sediment Source Evaluations

- Unpaved roads
- Streambanks
- Upland areas  
(within 100 feet of  
the stream)



High Density of Road Crossings  
Muddy Creek

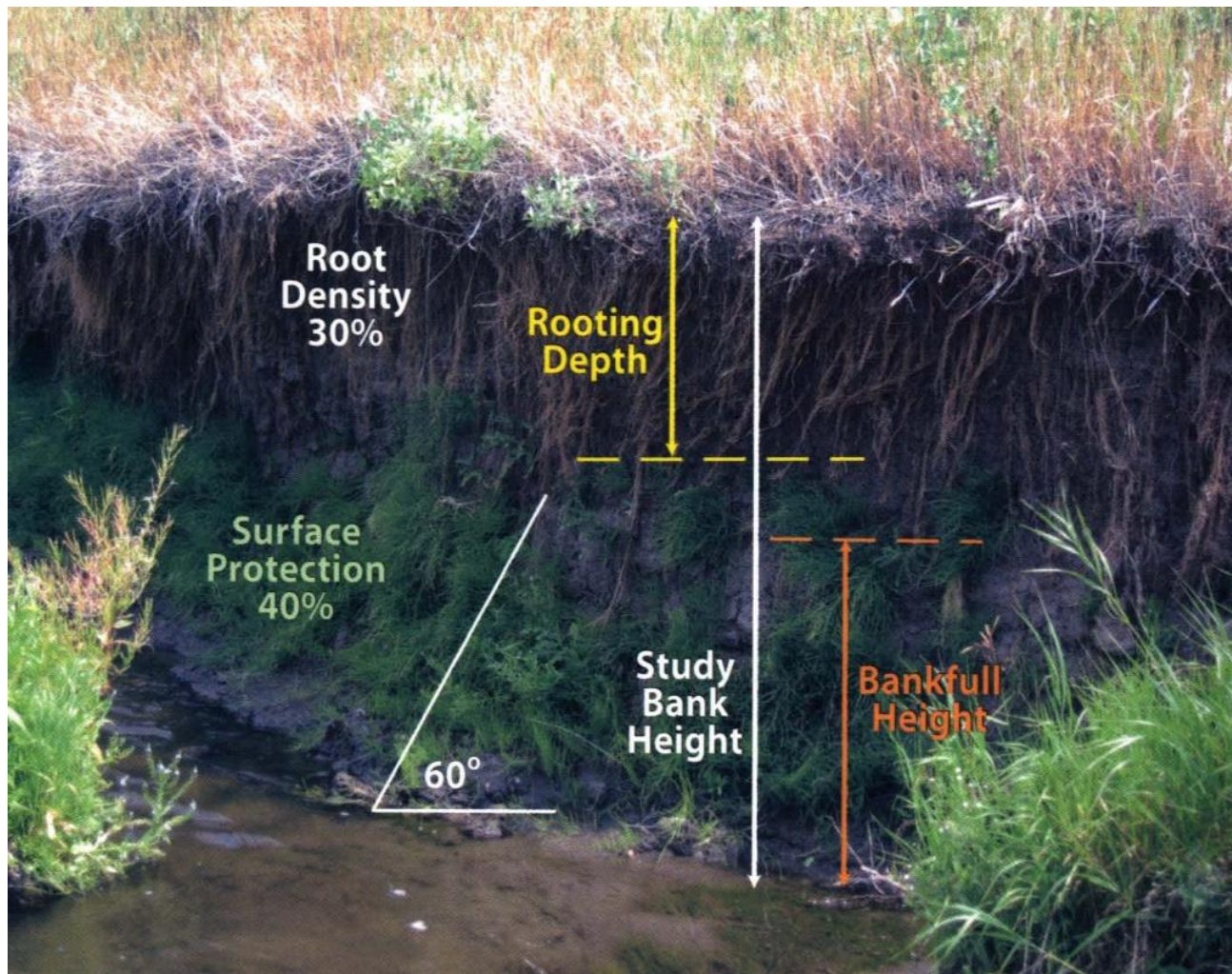


Low Density of Road Crossings  
Long Creek

- GIS estimates of number of road crossings and adjacent segments of road
- Extrapolated sediment loads based on knowledge of road practices

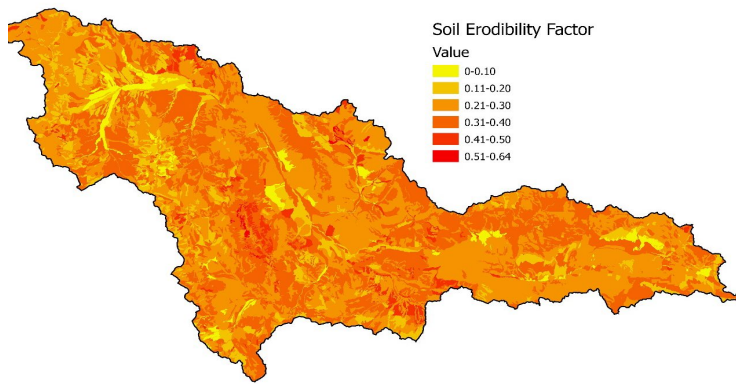
# Unpaved Roads



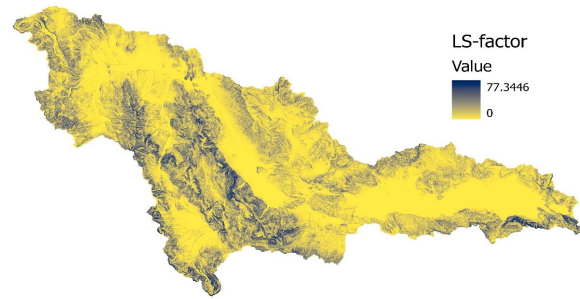


- Measurements to determine annual rates of erosion at sampled reaches
- Use to predict amount of erosion at unsampled reaches of similar size, slope, and riparian quality (from aerial photos)

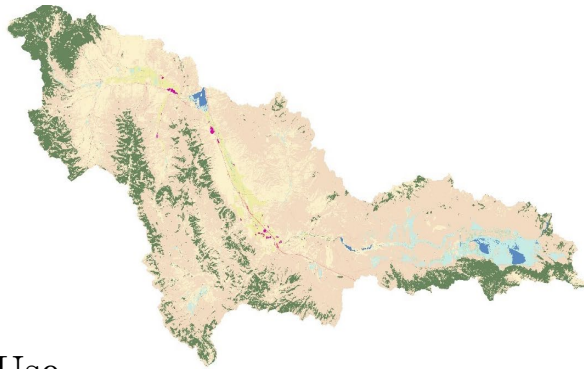
# Eroding Streambanks



Soil Erodibility

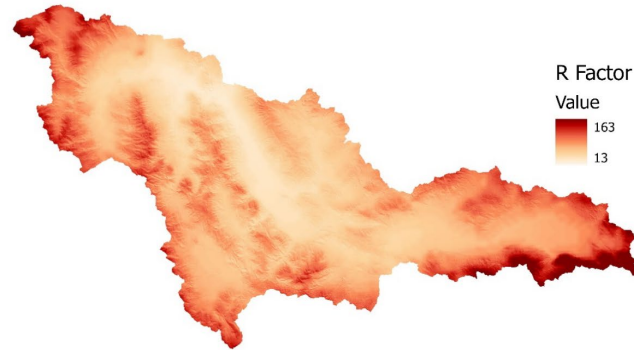


Length-Slope Factor



Land Use

(Assuming lack of cover crops and high intensity grazing in at least some riparian areas, and based on current width and quality of riparian zone from aerial photos)



R-factor (precipitation intensity)

- **Develop models of sediment inputs based on USLE**
- **Based on erodibility, land-use, slope, and distance to stream**
- **Width and quality of riparian zone factored into the model**

# Upland Erosion



# Percent Reduction:

Estimate of current sediment loads versus with additional Best Management Practices



Sediment Before BMPs

-

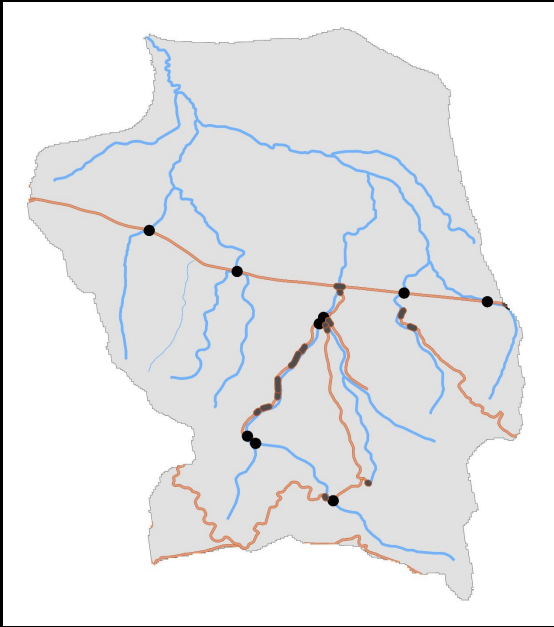
Sediment After BMPs

X

100

Sediment Before BMPs

# Peet Creek



## UNPAVED ROADS 2.5 TONS

BMP Load: 1.1 tons

- Re-grading
- Silt Fences
- Riparian Vegetation



## BANK EROSION: 1371 TONS

BMP Load: 833 tons

- Increase Riparian Zone Width and Quality

## UPLAND EROSION: 198 TONS

BMP Load: 115 tons

- Riparian Zone Width
- Conservation Tillage
- Moderate Decrease in Grazing in Riparian Zone



## Total Sediment Reduction Needed: 39%

# *E. coli*

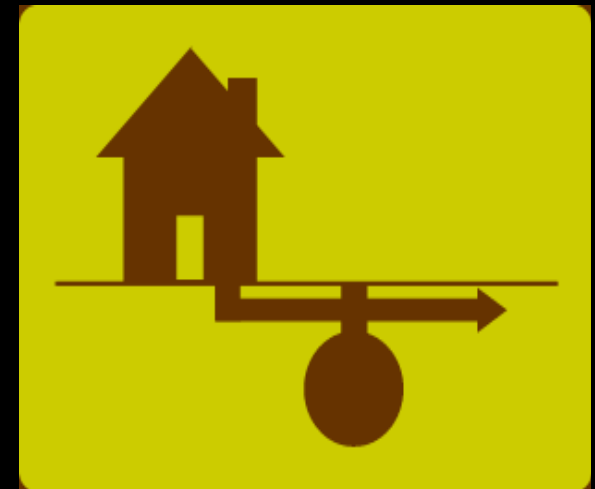
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*E. coli*

ē 'kōlī/

noun:

- A bacterium commonly found in the intestines of humans and other animals. Some strains can cause severe sickness, especially in old people and children.
- You may be exposed to *E. coli* from contaminated water or food
- *E. Coli* is measured in units of Colony Forming Units (CFU) per 100 ml





# Why *E.coli*?

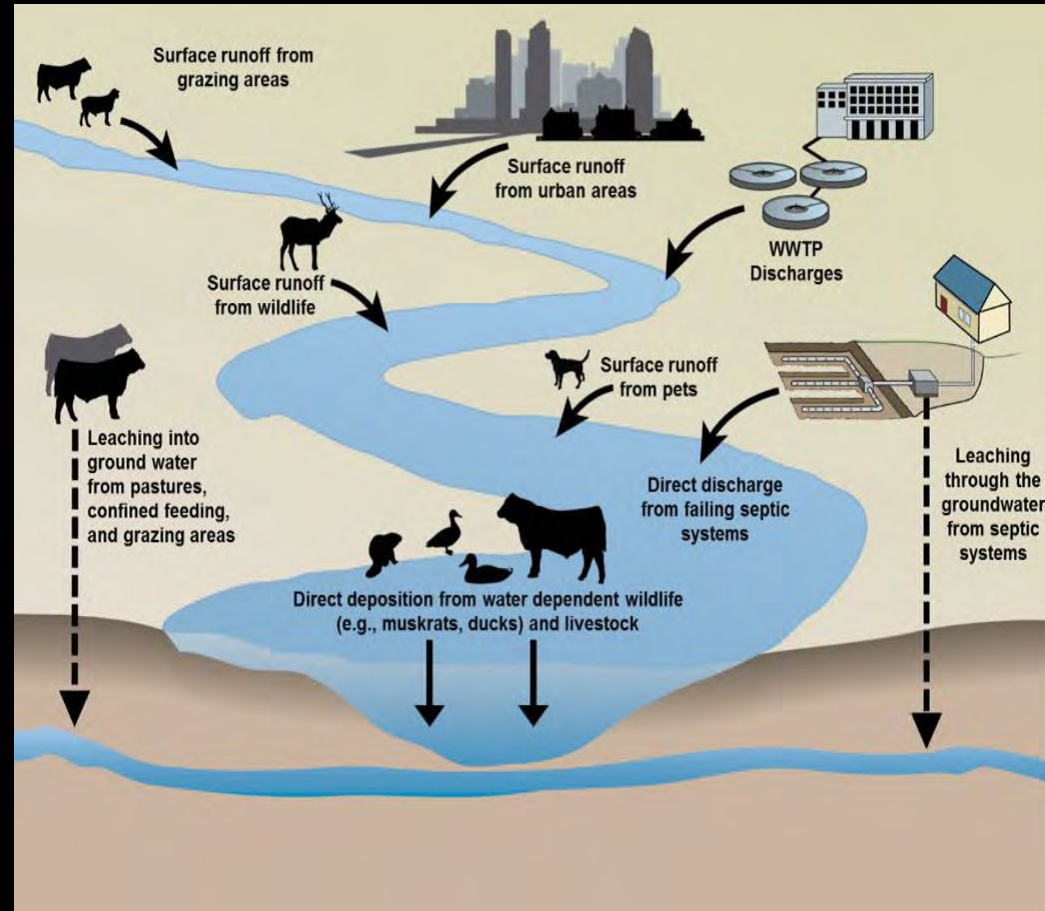
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- Primary Contact Recreation:
  - Water quality is to be maintained suitable for bathing, swimming and recreation



# *E. coli* Sources

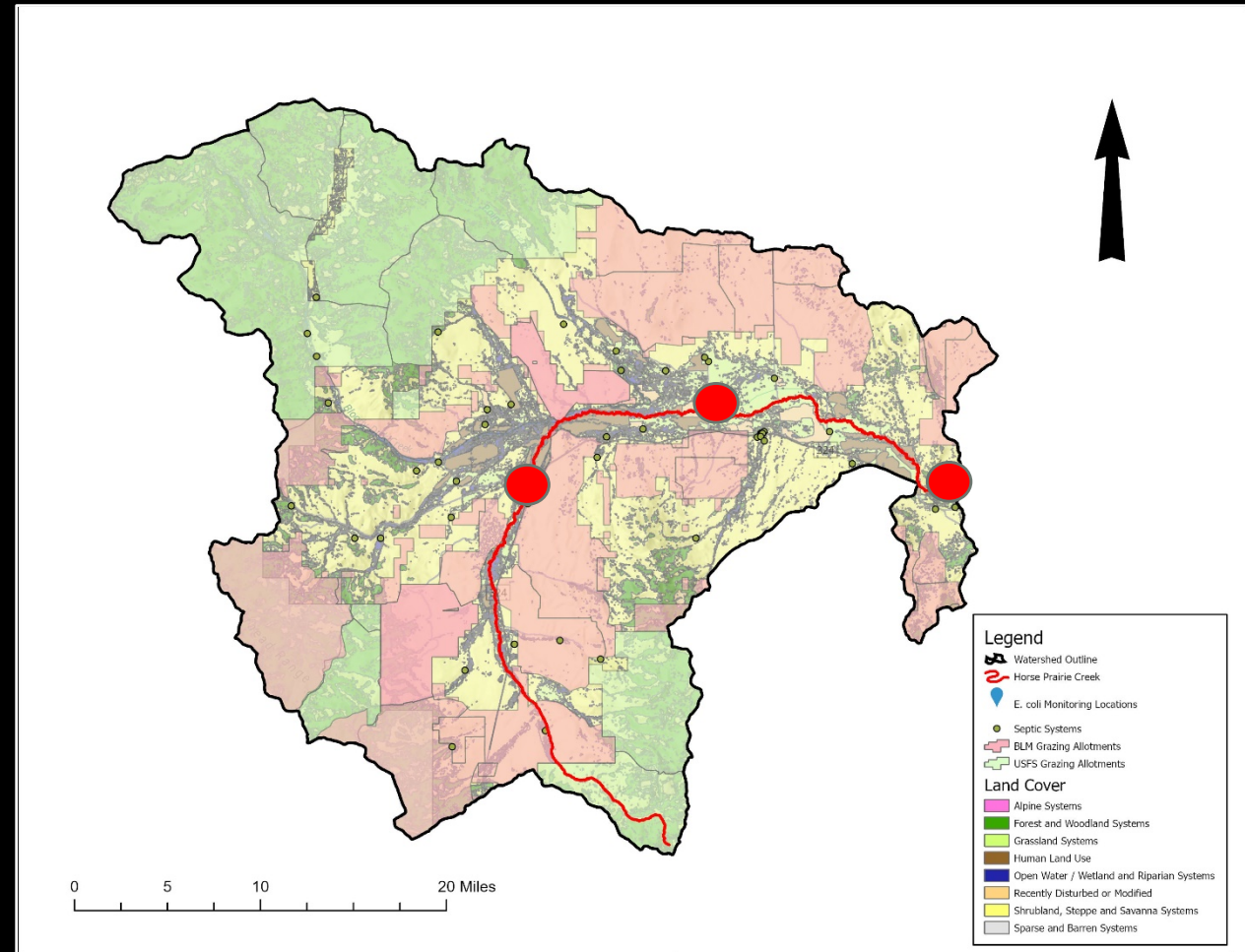
- Nonpoint Sources:
  - Agriculture land use (irrigated cropping and pasture/rangeland/forest grazing)
  - Recreation and domestic animals
  - Septic systems
  - Natural background (wildlife)



# Data Collection

- **Sampling conducted in 2017**
- Medicine Lodge Creek,
- Peet Creek
- Red Rock River (Lima Dam to Cark Canyon Reservoir)
- Horse Prairie Creek
- O'Dell Creek
- Red Rock River (Lima Dam to Clark Canyon Reservoir)

Horse Prairie Creek E. coli Sampling Points

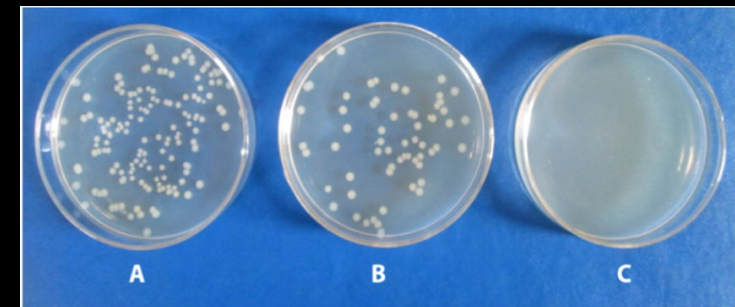




# E. coli Sampling and Analysis

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- Minimum of five samples obtained during separate 24-hour periods during any consecutive 30-day period
- Sample preservation
- Strict holding times, 6-hour handling time and 2-hour processing time.
- Sample incubation
- Sample interpretation



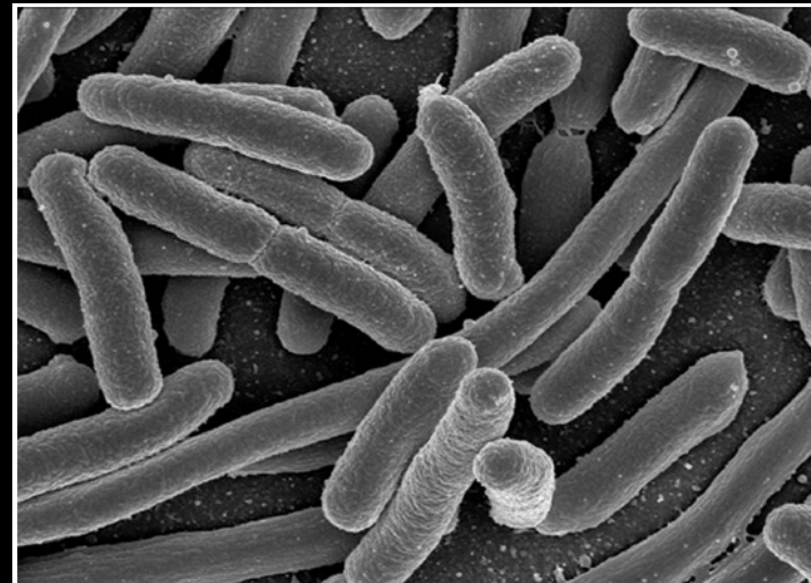
# *E. coli* Water Quality Targets

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<b>Applicable Period</b>	<b>Target Concentration (cfu<sup>1</sup>/100mL)</b>	<b>Analysis Type</b>	<b>Allowable Exceedance Frequency</b>	<b>Dataset Requirement</b>
Summer (April 1 – October 31)	126	Geometric mean	Not to be exceeded	Minimum of five samples obtained during separate 24-hour periods during any consecutive 30-day period
	252	Individual samples	<10% exceedance rate allowed	
Winter (November 1 – March 31)	630	Geometric mean	Not to be exceeded	
	1,260	Individual samples	<10% exceedance rate allowed	

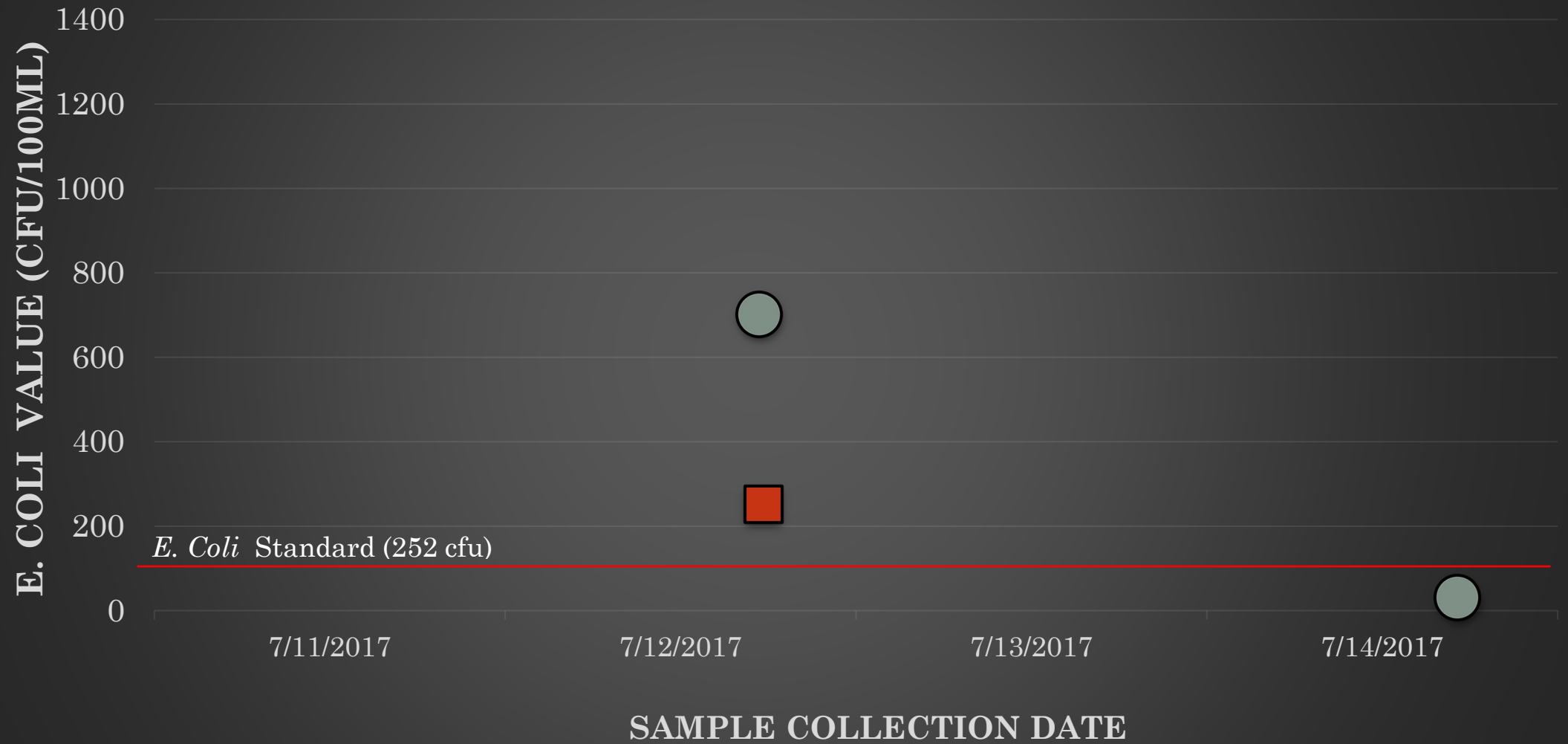
# *E. Coli* Assessment and Impairment

- Pathogen impairment occurs if either of the following are true:
  - Geometric mean of Colony Forming Units/100 mL exceeds 126
  - 10% of all *E.coli* sampling results exceed 252 (CFU/100mL)
- Beneficial uses impaired:
  - Primary contact recreation





# Horse Prairie Creek



# Impairment Determinations

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- **Impaired:**

- Medicine Lodge Creek,
- Peet Creek
- Red Rock River (Red Rock Lake to Lima Dam)
- Horse Prairie Creek

- **Not Impaired**

- O'Dell Creek
- Red Rock River (Lima Dam to Clark Canyon Reservoir)



Red Rock Creek

# Improving Stream Health

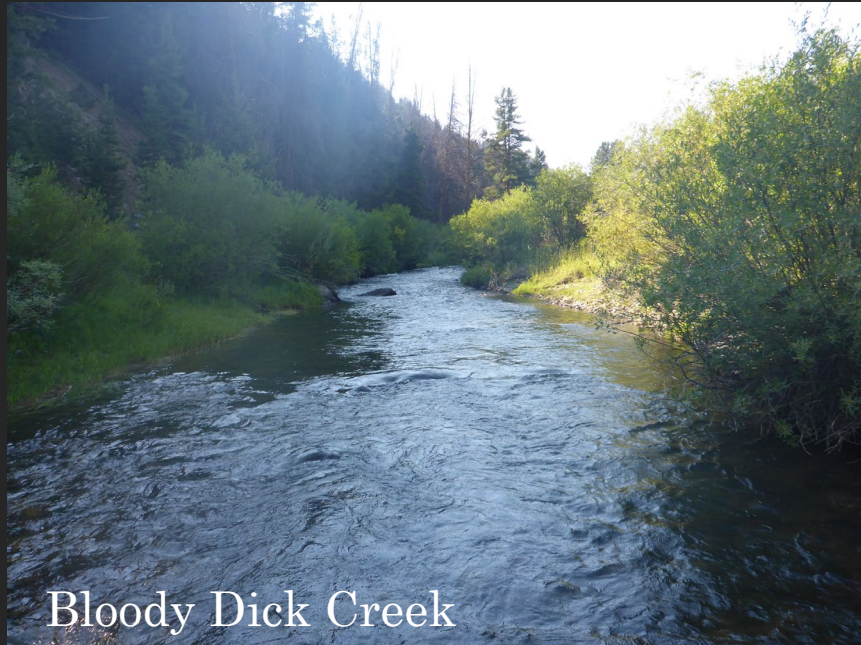




Red Rock Creek



Corral Creek



Bloody Dick Creek

What Does  
Healthy Look  
Like?





# How Do We Get to a Healthy Stream

- Improving riparian grazing management practices is the #1 factor that can improve stream health for most streams in the Red Rock watershed
- Other practices:
  - Urban streamside vegetation management
  - Irrigation water management
  - Education on responsible streamside recreation
  - Many programs that reduce impacts also help ranchers





## Additional practices related to mined areas



- Removal of mine tailings
- Maintaining tailing ponds from abandoned mines
- Monitoring and permits to ensure any future point discharge is meeting standards
- Any activity that reduces sediment to streams





## How Do We Fund Water Quality Improvement Practices

- Section 9.7 of the TMDL document discusses funding opportunities
- Various grants are available for government and nonprofit agencies, such as conservation districts and local watershed and conservation groups
- Federal funding is available for private landowners through the NRCS
- DEQ Nonpoint Source Pollution Program staff are available to assist with obtaining funding (after Restoration Plan is in Place)

**National Resource Conservation Service:** Provides guidance and potential financial assistance for conservation activities by private landowners

**Centennial Valley Association:** Monitors stream flow and drought conditions, hosts nature programs, and does invasive species inventories and control

**USFS and BLM:** Conduct their own stream monitoring, often including conservation and restoration activities

**FWP Candidate Conservation Agreement:** Enrolls ranchers in voluntary activities resulting in improved riparian health and streamflow for Arctic Grayling

Zach Owen: Beaverhead Watershed Committee





**Red Rock Metals, Sediment and *E. coli*  
TMDLs and Water Quality Improvement  
Plan**



July 2021

*Greg Gianforte, Governor  
Chris Darrington, Director DEQ*



Document Number xxx

# The TMDL Document

[https://deq.mt.gov/files/Water/WQP/B/TMDL/PDF/RedRockWS/RedRockMetals\\_Sed\\_EcoliTMDLsPublicDraft\\_7\\_28\\_21.pdf](https://deq.mt.gov/files/Water/WQP/B/TMDL/PDF/RedRockWS/RedRockMetals_Sed_EcoliTMDLsPublicDraft_7_28_21.pdf)

# Future Document: Stream Summaries

## Antelope Creek

**Location Description:** Headwaters to junction with Cliff Lake

**Impairments:** Sediment, Flow Alteration, Alterations to Streamside Vegetation

**Negatively Affects:** Aquatic Life

### Problem

The excess fine sediment loading at the upper DEQ-monitored site (ATLP 04-02) is linked to riparian grazing in the form of trampled streambanks and over-widened areas of the stream from cattle crossings.

### Solutions

Riparian area improvements in the form of grazing best management practices could eventually result in reducing sediment loading enough to meet the water quality standard. The DEQ-monitored site on lower Antelope Creek (ATLP 10-01) demonstrated stable streambanks and a recovering riparian area due to a more recent fencing project and hardened stream crossing that has reduced livestock access to the stream.

### Potential Restoration Project Locations

The project locations discussed in this section are directly linked to riparian grazing management or other riparian zone improvement BMPs that would subsequently result in reduced bank erosion and improvements in the stream's ability to transport sediment and provide aquatic habitat (channel form and function). Based on reviews of aerial photography, riparian areas generally appear healthy along the very upper reaches of Antelope Creek. Heavy grazing throughout the middle and lower portions of Antelope Creek is likely creating the same conditions seen at the DEQ-monitored site ATLP 04-02 (unstable streambanks and unhealthy riparian areas). Additionally, Antelope Creek runs dry during the summer months below ATLP 04-02 and projects to increase streamflow during hot summer months would prove beneficial to aquatic life as well as the riparian area for maintaining stable streambanks.



A trampled streambank from cattle access at monitoring site ATLP 04-02



Healthy riparian vegetation along Antelope Creek



Monitoring site ATLP 10-01 above Cliff Lake

## Antelope Creek

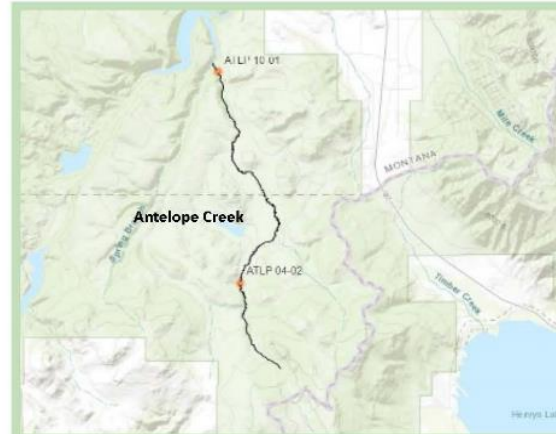
### WATERSHED RESTORATION PLAN INFORMATION

#### Antelope Creek WRP Elements

Waterbody / Assessment Unit ID: MT41F004\_140

Impairments Addressed in TMDL Document	Applicable Document Section(s)			
	Source Assessment	Load Reductions	Targets	Water Quality Improvement Practices & Monitoring Plan
Sedimentation – Siltation	5.4.3.1, 5.5	5.6, 5.7.1	5.4.1	9.0, 10.0
Alteration in stream-side or littoral vegetative covers	NA	NA	NA	8.0, 9.0, 10.0
Flow Regime Modification	NA	NA	NA	8.0, 9.0, 10.0

NA = not applicable



### MONITORING LOCATIONS AND COLLECTED DATA

#### Legend

Sediment, Bank Erosion, and Greenline Sites

Study Stream

#### Antelope Creek Sediment Monitoring Locations

Site ID	Collection Entity	Latitude <sup>1</sup>	Longitude <sup>1</sup>	Monitoring Parameters
ATLP 04-02 (M06ANTLC02)	DEQ	44.68141	-111.52829	Instream fine sediment <sup>2</sup> Instream habitat BEHI Greenline
ATLP 10-01 (M06ANTLC02)	DEQ	44.74677	-111.53753	Instream fine sediment <sup>2</sup> Instream habitat BEHI Greenline

<sup>1</sup> Latitude/longitudes are the downstream end of the sampling site

<sup>2</sup> Instream fine sediment includes cross sections, pebble counts and pool tail grid tosses

# How to Submit Comments

Mail to:

DEQ – Water Quality Division

PO Box 200901

Helena, MT 59620

Email to:

Christy Meredith,

[Christy.Meredith@mt.gov](mailto:Christy.Meredith@mt.gov)

Lou Volpe

[Lvolpe@mt.gov](mailto:Lvolpe@mt.gov)

Comments Due:  
Wednesday, August 18,  
2021





# TMDL Document Completion Steps

- DEQ reviews all public comments, makes document edits, and writes responses to public comments
- Document submitted to U.S. EPA for approval
- Upon approval, final document is posted on DEQ's website
- The TMDL document is used to guide water quality improvement plans and practices



# Questions?

