Montana TMDL Stream Summaries

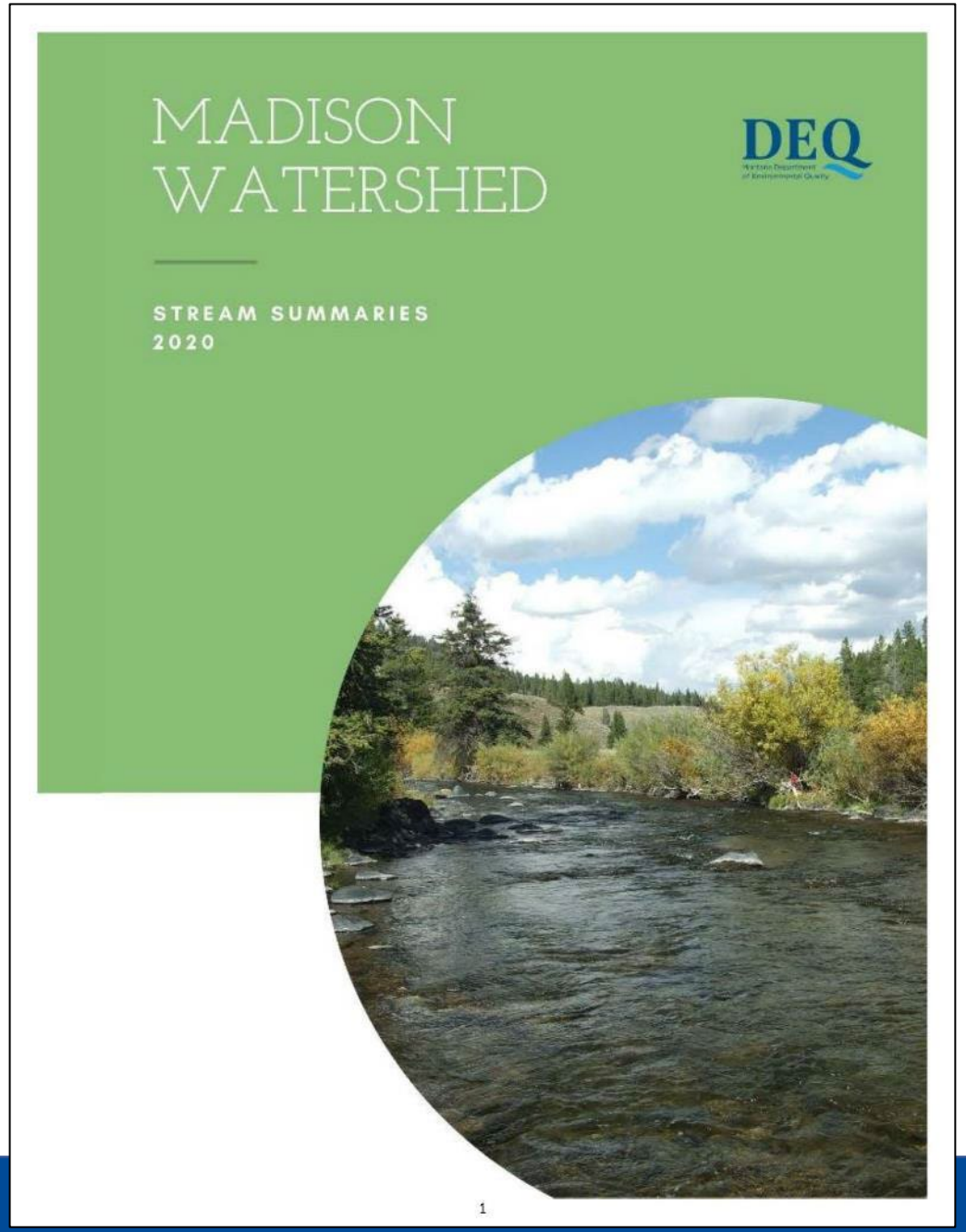
National Training Workshop on Water Quality Data, Assessment, & Plans

Christina Staten, Montana DEQ TMDL Section Supervisor

June 2, 2025

Today's Topics

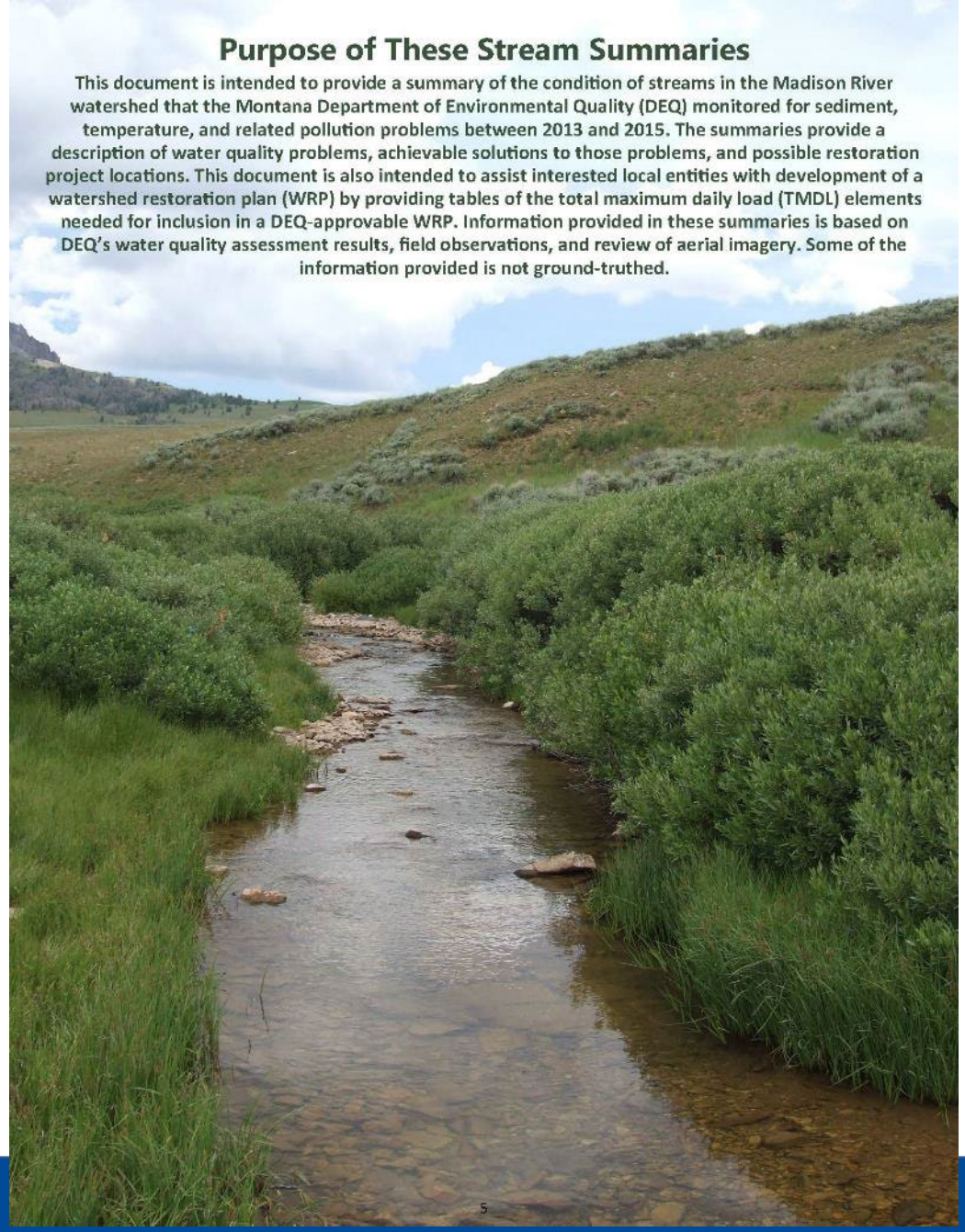
- TMDL Stream Summaries Purpose & Overview
- Stakeholder Feedback / Pros & Cons
- Development Process & Future Changes
- Takeaways



TMDL Stream Summaries Purpose

- Create an easily digestible format for stakeholders and landowners to understand the condition of streams in their watershed
- An accompaniment to complex TMDL documents
- Assist with 9-element watershed plan development for local entities

- Goal: Make the TMDL document more implementable



Stream Summaries Overview

- Two-page summary of each stream addressed in the TMDL process providing:
  - Description of water quality problems
  - Achievable solutions
  - Possible restoration project locations
  - Photos of good and bad stream conditions
  - Map and table of monitoring locations
  - Table of TMDL elements for inclusion in a 9-element watershed plan

Madison Stream Summaries 2020

Moore Creek

Location Description: Springs to junction with Fletcher Channel

Impairments: Sediment, Temperature, Alterations to Streamside Vegetation

Negatively Affects: Aquatic Life

Problem

Riparian grazing is the main contributor of excess fine sediment reaching Moore Creek, with urban encroachment (reduced riparian buffer widths and lack of native riparian vegetation) also affecting the stream where it flows through the town of Ennis. Irrigation diversions and loss of riparian habitat from irrigated cropland are directly influencing elevated stream temperatures in Moore Creek. Residential development around the town of Ennis is also contributing to temperature problems through the replacement of native, woody riparian vegetation with grass lawns that do not provide shade to the stream. In the upper portions of Moore Creek, riparian grazing is diminishing shade-providing riparian vegetation.

Solutions

Improvements to riparian grazing practices, along with increased buffer widths along irrigated cropland and residential property, will improve sediment and temperature-related water quality problems. Where possible, irrigation diversion efficiencies should be pursued to increase instream flow and reduce stream-canal exchanges/interactions. Additionally, perched culverts that create fish-passage barriers should be addressed, and undersized road culverts should also be replaced.

Potential Restoration Project Locations

Livestock access to the stream should be limited where possible, in conjunction with improved riparian grazing management practices. Restoration opportunities exist for many small "ranchettes" near the town of Ennis, as well as for small confined feeding operations adjacent to the stream. Directly within the town of Ennis, lawn encroachment (reduced riparian buffer widths) should be discouraged and revegetation opportunities exist for these locations. Additionally, road crossings just upstream of Frieler Creek were noted during DEQ field work as needing improvements.

An Inadequate streamside buffer between a lawn and Moore Creek

Unhealthy streamside vegetation and trampled streambanks resulting from livestock access to Moore Creek

Lack of shading streamside vegetation resulting from livestock grazing along Moore Creek

DEQ MONTANA

Moore Creek

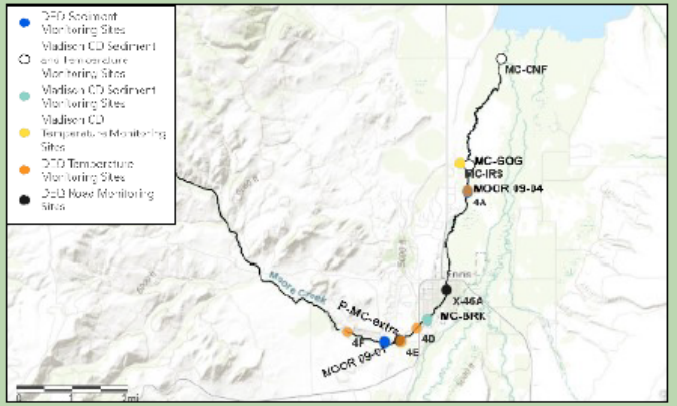
WATERSHED RESTORATION PLAN INFORMATION

Moore Creek WRP Elements
Waterbody/Assessment Unit ID: MT41F004_130

Impairments Addressed in TMDL Document	Applicable Document Section(s)			
	Source Assessment	Load Reductions	Targets	Water Quality Improvement Practices & Monitoring Plan
Sedimentation – Siltation	5.4.3.7, 5.5	5.6, 5.7.7	5.4.1	9.0, 10.0
Temperature	6.6.1, 6.6.4	6.7, 6.8.3	6.4.1.5, 6.4.2.3	9.0, 10.0
Alteration in stream-side or littoral vegetative covers	NA	NA	NA	8.0, 9.0, 10.0

NA = not applicable

MONITORING LOCATIONS AND COLLECTED DATA



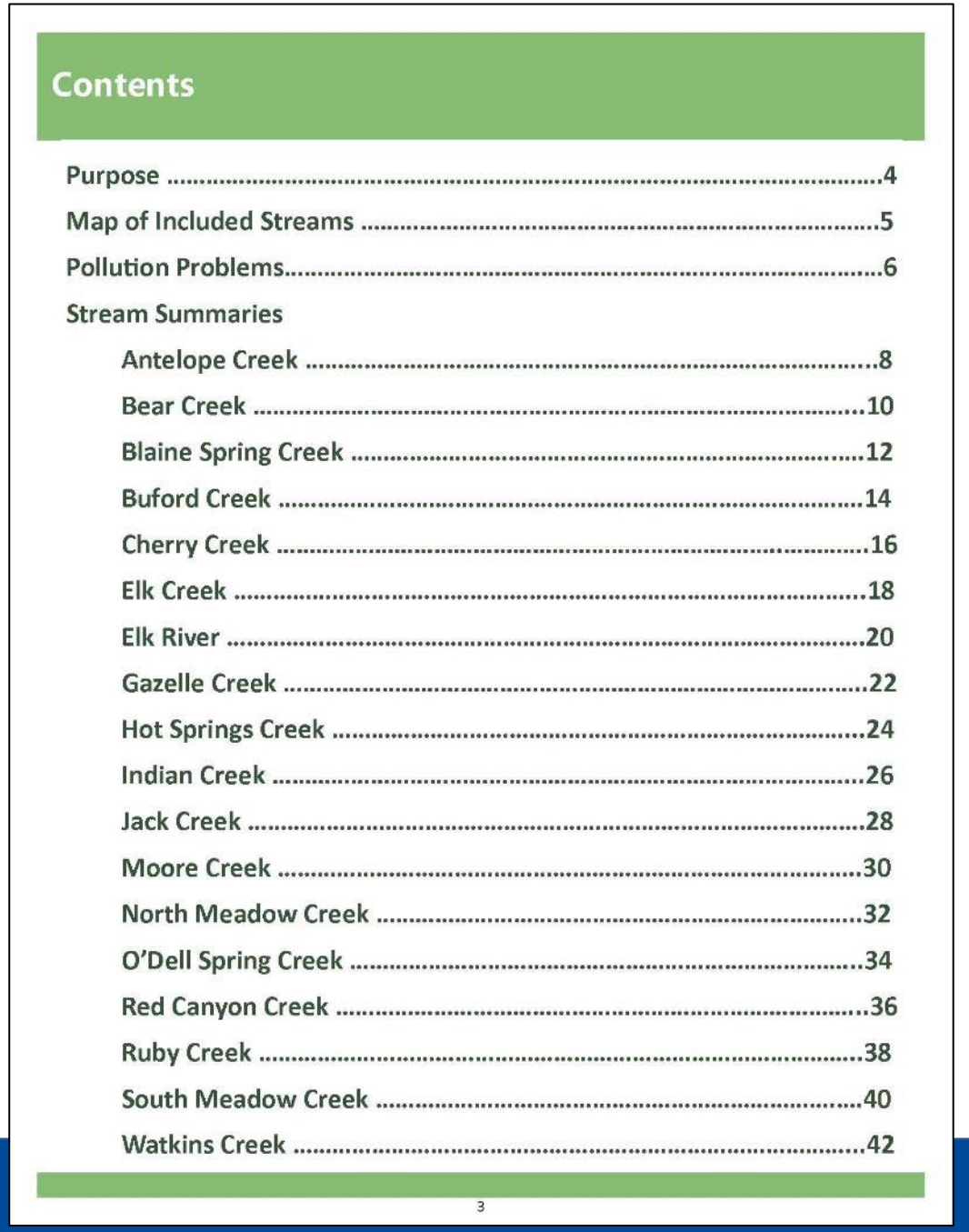
Moore Creek Sediment and Temperature Monitoring Locations

Site ID	Collection Entity	Latitude	Longitude	Monitoring Parameters
MOOR 09-01 (M06MOREC09)	DEQ	45.33268	-111.75392	Instream fine sediment[1] Instream habitat BEHI Greenline
MOOR 09-04 (M06MOREC01)	DEQ	45.37174	-111.72272	
MC-BRK	Madison CD	45.338583	-111.737733	Pebble Count
MC-GOG	Madison CD	45.3787	-111.721883	Pebble Count Hourly Temperature Flow
MC-CNF	Madison CD	45.406833	-111.709983	
MC-IRS	Madison CD	45.379317	-111.7254	Hourly Temperature Flow
X-46A	DEQ	45.34636	-111.73048	Road crossing
P-MC-extra	DEQ	45.33325	-111.74823	Parallel road segment
4A (M06MOREC01)	DEQ	45.3719	-111.7227	Temperature data logger Shade Flow Cross section
4D (M06MOREC02)	DEQ	45.3363	-111.7420	
4E (M06MOREC06)	DEQ	45.3329	-111.7478	
4F (M06MOREC03)	DEQ	45.3354	-111.7679	

[1] Instream fine sediment includes cross sections, pebble counts and pool tail grid tosses

Stream Summaries Contents

- Watershed map of included streams
- Summary of watershed-wide pollution problems
- Two-page stream summaries
- Notes for nine-element watershed plan development
- Glossary



Contents

3

Madison Stream Summaries 2020

Pollution Problems

Sediment

Sediment is a naturally occurring component of a healthy and stable stream system. Excess amounts of sediment, however, has many negative effects. Accumulation of fine sediment reduces availability of suitable spawning habitat for fish and smothers fish eggs and fry. Accumulation of large particles, such as cobbles, leads to over-widened channels and reduced streamflow (sometimes leading to subsurface flow). Water can also appear murky when excess sediment is suspended in the water (turbidity).

Human-Caused Sources

- Streambank Erosion
- Erosion from dirt/gravel roads
- Construction sites
- Mining
- Agricultural activities

Solutions

Improve health of streamside vegetation to increase streambank stability and filter sediment from reaching the stream from upland sources.

Temperature

Montana's western streams naturally run cold and support trout fisheries. Increased stream temperatures from solar radiation or human additions of heated water threaten the health of fish by reducing dissolved oxygen and increasing amounts of algae growing in the stream that further reduces available dissolved oxygen for fish. Higher stream temperatures also make fish more susceptible to disease and boost the opportunity for non-native fish more tolerant of higher stream temperatures to outcompete native trout.

Human-Caused Sources

- Removal of native streamside vegetation
- Irrigation withdrawals
- Warm irrigation return flows

Solutions

Improve health of streamside vegetation to create temperature-reducing shade and channel stability (keep streams from becoming wide and shallow).

Pollution Problems

Flow Modifications

Flow modification refers to a change in the flow characteristics of a waterbody relative to natural conditions. Modifications could be associated with changes in runoff and streamflow, commonly linked to elevated peak flows. Road crossings, particularly where culverts are undersized or inadequately maintained, can also alter flows by causing water to back-up upstream of the culvert. Irrigation withdrawal management can lead to base flows that are too low to support aquatic life and recreational activities, or result in dry channels. Low flow conditions absorb solar radiation more readily and increase stream temperatures, which in turn creates dissolved oxygen conditions too low to support some species of fish.

Human-Caused Sources

- Urban development
- Timber harvest
- Undersized culverts
- Irrigation withdrawal management

Solutions

- Install properly sized culverts at stream crossings
- Implement irrigation efficiency projects, where appropriate
- Maintain buffers between streams and timber harvest areas
- Avoid straightening stream channels

Instream and Streamside Habitat Alterations

These alterations refer to circumstances where practices along stream channel have altered or removed vegetation and cases where the stream has been physically altered or manipulated. These changes subsequently alter channel shape and stream temperature, and may result in loss of instream habitat (riffles and pools).

Human-Caused Sources

- Removal of streamside vegetation
- Overgrazing in stream corridors
- Channel straightening to accommodate roads, agricultural fields, or mining operations
- Channel alterations due to new infrastructure (roads, bridges, dam impoundments)

Solutions

- Maintain streamside buffers
- Grazing management practices that maintain healthy streamside vegetation
- Maintain natural stream shape and pattern and allow streams to move/migrate (avoid straightening streams)

DEQ MONTANA

Stakeholder Feedback

- Local groups developing 9-element plans found them helpful
- Need a section on applicable water quality improvement practices to accompany the pollution problems overview

Red Rock Stream Summaries - 2022

- Addition of water quality improvement practices applicable to most streams

Water Quality Improvement Practices

Overview

The water quality restoration objective for the Red Rock TMDL Planning Area is to reduce sources of pollution, as identified throughout this document, in order to meet the water quality standards for full recovery of beneficial uses for all impaired streams. These improvements will also increase riparian vegetation quality and instream habitat. TMDLs can often be achieved through proper implementation of best management practices. The following are some water quality improvement practices, most of which are outlined in section 10.3 of the TMDL document and/or in the Montana Nonpoint Source Management Plan.

Metals

- Removing mine tailings
- Reducing surface disturbance
- Maintaining instream flows to provide dilution and reduce concentrations during low-flow periods

Sediment

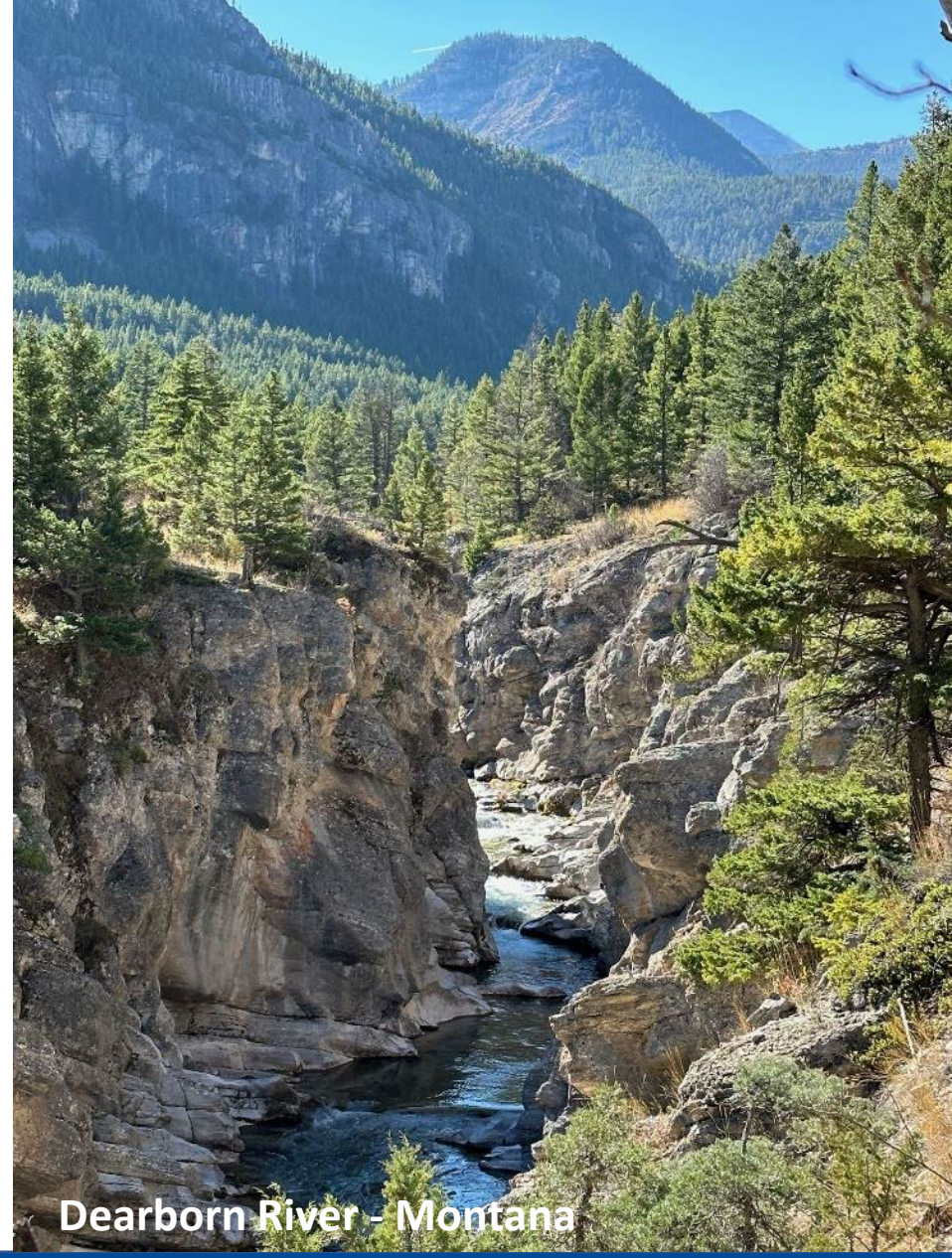
- Improving riparian vegetation quality and quantity
- Reducing upland erosion through cover crops and conservation tillage
- Developing grazing management plans that incorporate soil erosion control and related activities to maintain water quality and wildlife health
- Practicing off-channel watering to reduce cattle access to waterways
- Implementing best management practices for unpaved roads including silt fences, vegetated buffers, water bars, and reshaping
- Conducting forestry harvest activities that incorporate BMP practices

E. coli

- Maintaining storage of manure using locations and methods to reduce transport to surface and groundwater
- Applying manure to soils using rates and methods that reduce the amount entering surface water
- Properly locating,designing, and maintaining of septic systems

Pros & Cons

- Pros
  - Creates a friendly TMDL document summary
  - Can kick-start the 9-element watershed plan process
- Cons
  - Time intensive to create
  - Difficult to produce simultaneously with the TMDL document
  - MS Publisher is clunky and generates large file sizes


Dearborn River - Montana

Development Process – First Effort

- Convened a working group to compile notes and thoughts
- Included the local watershed group representative (paid for their time & travel)
- Reviewed all field form notes and photos from multiple years of monitoring
- Aerial imagery review
- Created in MS Publisher
- Sent draft to watershed group for review and incorporated edits
- Published to DEQ website and relied on watershed group to get the word out

Development Process – Second Effort

- No working group: assigned to one person
- Same process of aerial imagery review, field notes and photos review to develop recommendations
- Used MS Publisher again


Taylor Fork Watershed - Montana

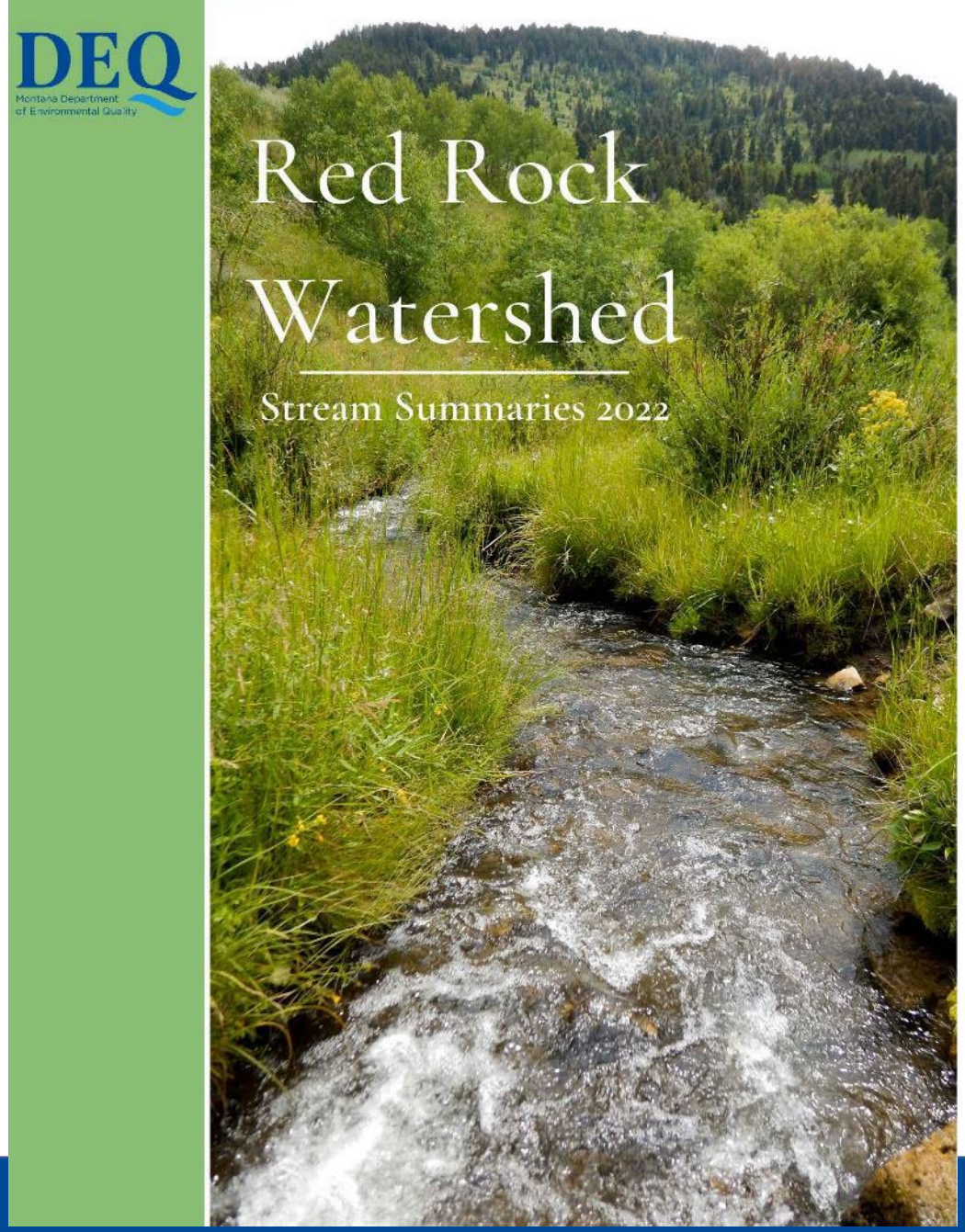
Future Changes

- Would like to publish in conjunction with the TMDL document
- Will be incorporating other GIS imagery review products into output instead of a separate effort
- May be modifying contents to meet needs of the watershed stakeholders


Taylor Fork - Montana

Takeaways

- Stream summaries simplify the TMDL document and make it more implementable
- A good way to communicate with landowners/land managers
- Time intensive to create
- Difficult to slim down content to two pages – takes a little creativity



Contact Info & Example Summaries

- Madison Stream Summaries: https://deq.mt.gov/files/Water/WQPB/TMDL/PDF/Madison/MadisonStreamSummaries2020.pdf

- Red Rock Stream Summaries: https://deq.mt.gov/files/Water/WQPB/TMDL/PDF/RedRockWS/RedRockStreamSummaries2022.pdf

- **Christina Staten**
- *TMDL Section Supervisor*
- CStaten@mt.gov
- (406) 444-2836