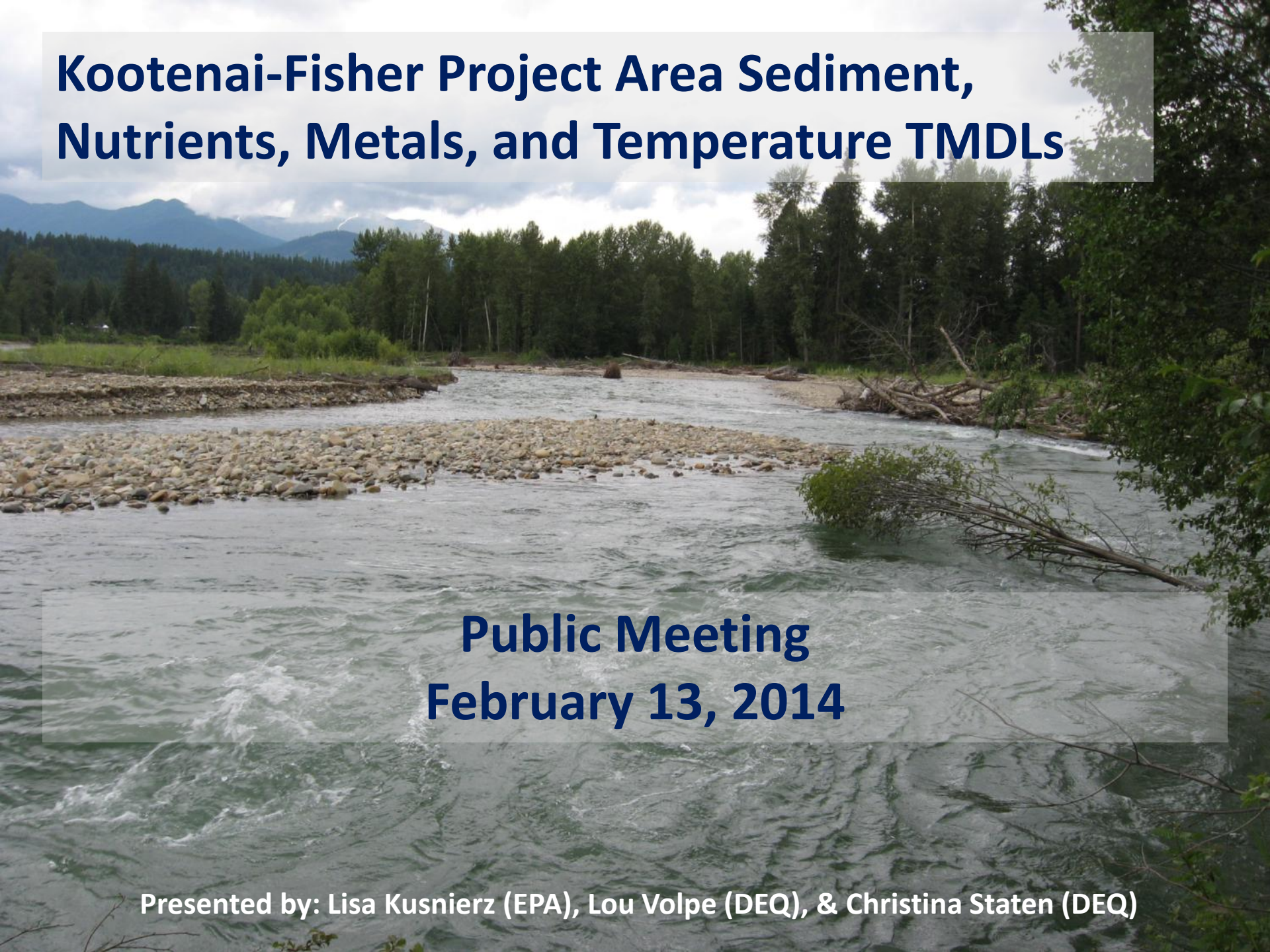
# Kootenai-Fisher Project Area Sediment, Nutrients, Metals, and Temperature TMDLs

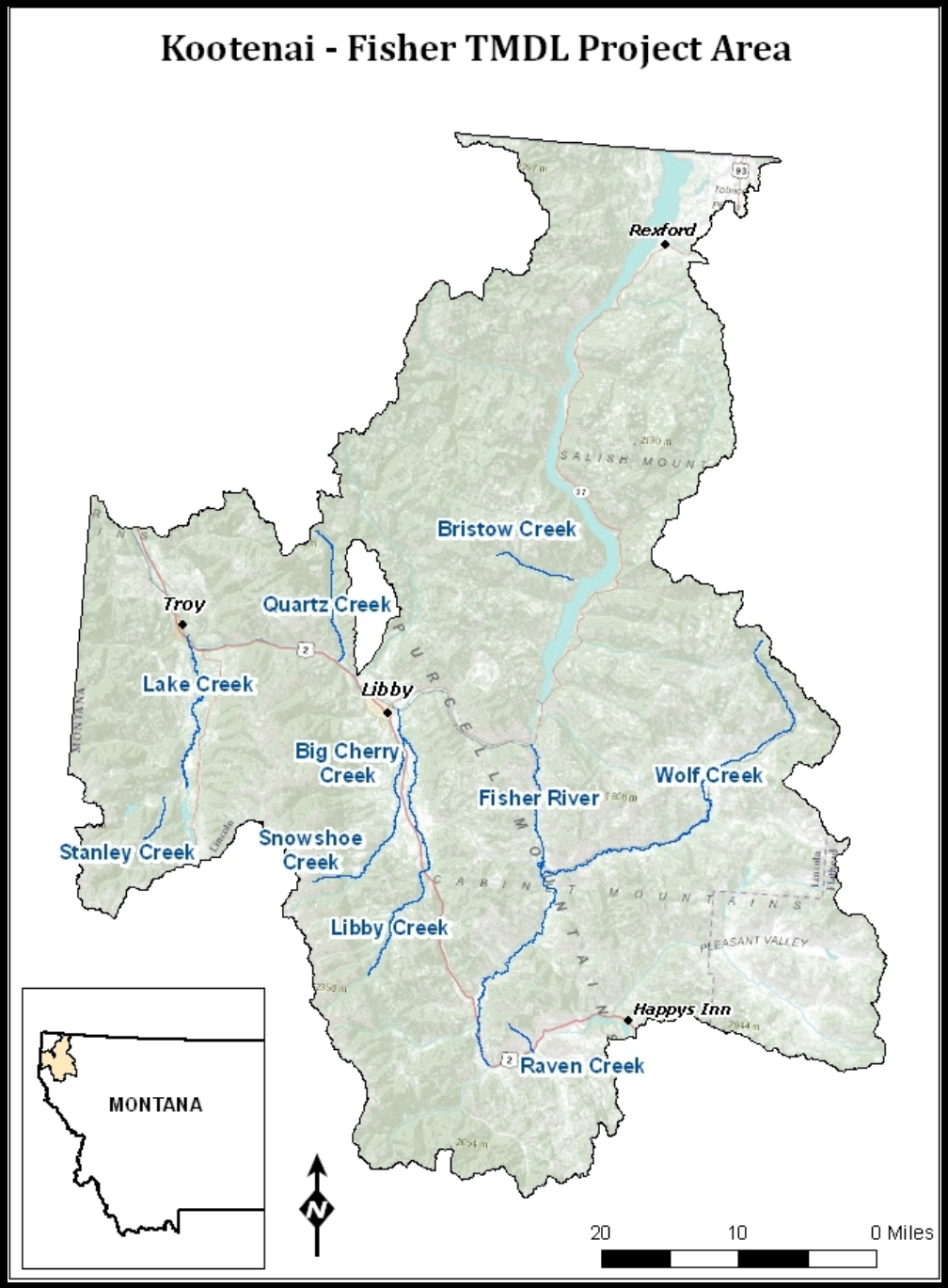


## Public Meeting
## February 13, 2014

Presented by: Lisa Kusnierz (EPA), Lou Volpe (DEQ), & Christina Staten (DEQ)

# Presentation Outline:

- Kootenai – Fisher TMDL Project Area
- What are TMDLs and Why Do We Need Them?
- What's in the TMDL Document?
- Sediment, Nutrients, Temperature & Metals Assessment Methods & TMDLs
- Implementation Strategy & Next Steps
- Public Comment Information




# Included Streams

Big Cherry Creek

Bristow Creek

Fisher River

Lake Creek

Libby Creek

Quartz Creek

Snowshoe Creek

Stanley Creek

Wolf Creek

# Not Included In This Project:

| Waterbody | Pollutant Impairment |
|---|---|
| Kootenai River | Temperature |
| Lake Koocanusa | Selenium |

# TMDL Overview

Presented by: Lisa Kusnierz, Sediment, Nutrients, & Temperature Project Manager

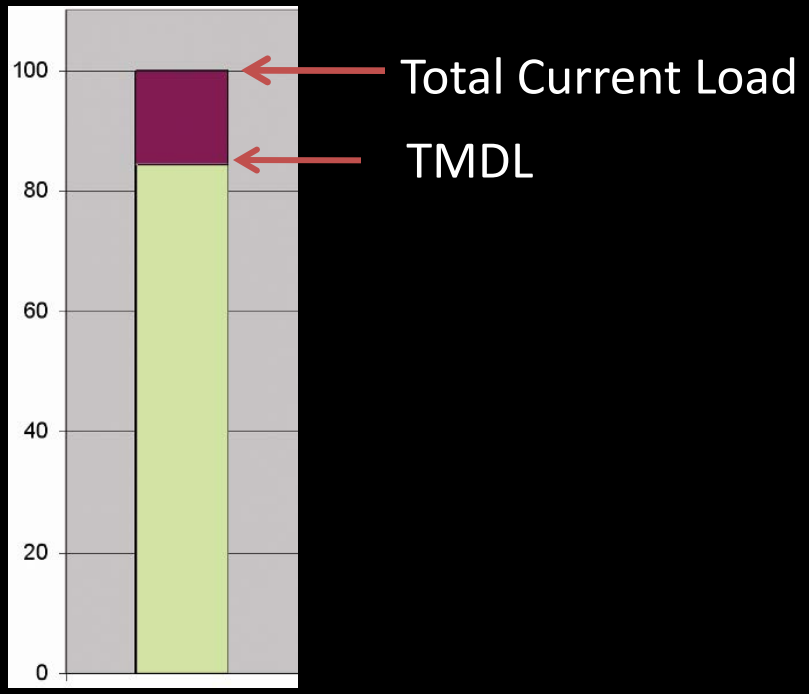
Photo Of Libby Creek

# What is a TMDL?

- **T**otal **M**aximum **D**aily **L**oad is the amount of a pollutant that a stream can receive from all sources and still meet water quality standards
- It may be expressed as a load per unit time (e.g. lbs/day)

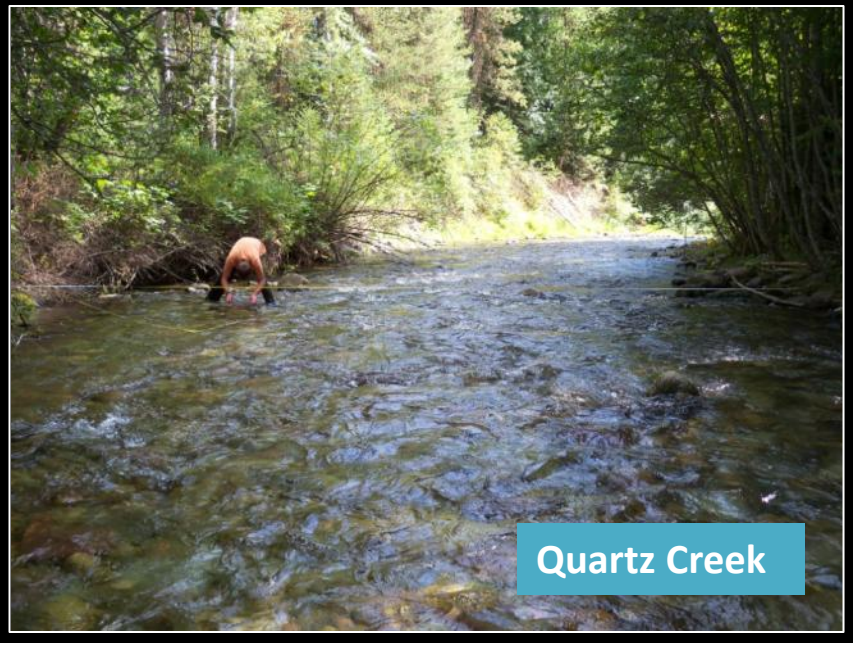
  or

  as a percent load reduction (e.g. 36% reduction)



# Why Do We Write TMDLs?

- The Clean Water Act (CWA) requires states to assess the quality of their waters
- The goal of the CWA is to ensure that all surface waters are capable of supporting designated beneficial uses.




# Water Quality Standards

- Numeric or Narrative (Descriptive)
- Protect Designated Uses Such as Agriculture & Aquatic Life

Recreation

Agriculture

Aquatic Life

# Why Do We Write TMDLs?

- Water quality standards form the basis for determining whether a waterbody is supporting its beneficial uses
- DEQ uses monitoring data to assess water quality & compare to applicable water quality standards
- Waterbodies not meeting water quality standards, and therefore not supporting one or more beneficial uses, are placed on a list of impaired waters

# Why Do We Write TMDLs?

Per CWA & Montana state law, TMDLs must be developed for each waterbody - pollutant cause of impairment

# Major Types of Pollutants




# How Many TMDLs?

TMDLs are specific to a waterbody and a pollutant, so a single waterbody may have multiple TMDLs

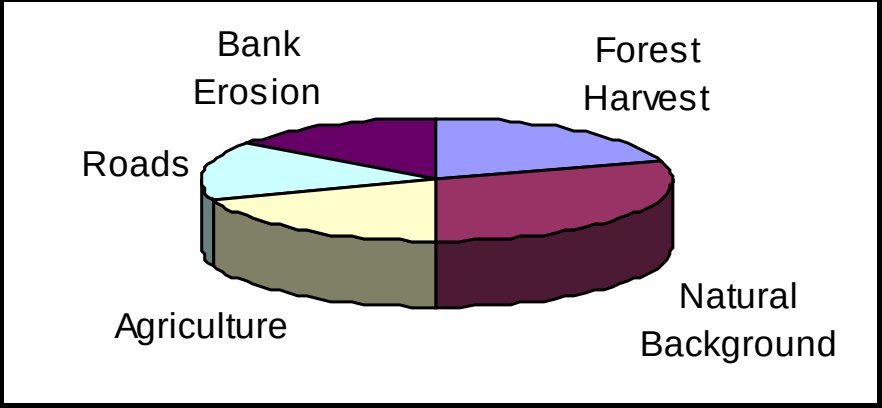
Snowshoe Creek has 4:  As, Cd, Pb, Zn

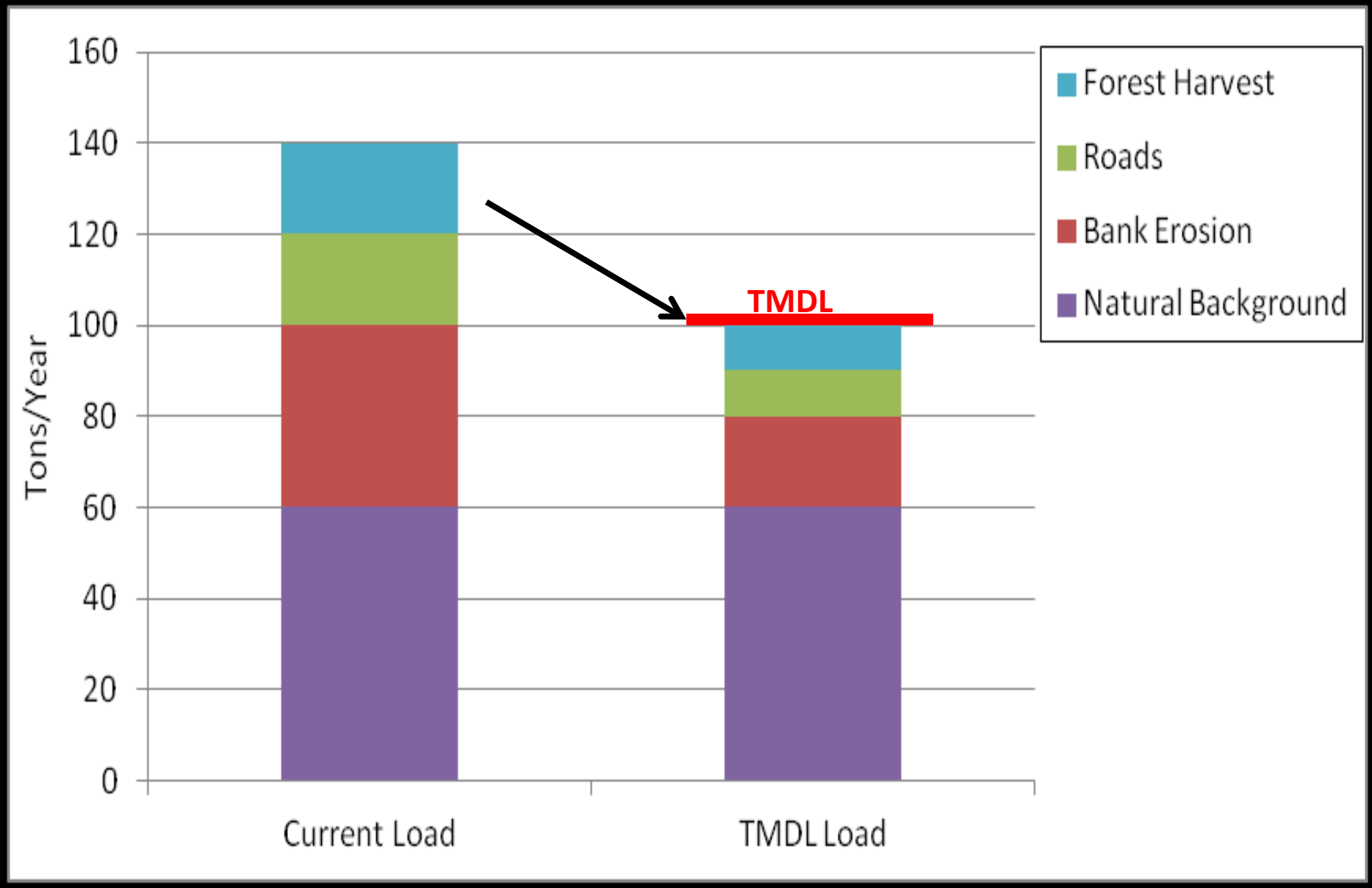
# TMDL Development Steps

- Identify Water Quality Targets
- Determine Water Quality Impairment Status
- Characterize and Quantify Sources of the Problem (Source Assessment)
- Establish the TMDL & Associated Allocations

# What Makes Up a TMDL or the Allowable Load?

- TMDL = Load Allocation (LA) + Wasteload Allocation (WLA) + Margin of Safety
- The TMDL must be allocated to sources
- Allocations usually based on existing loading and opportunity for reductions via BMPs




160
140
120
100
80
60
40
20
0
Tons/Year
TMDL
Forest Harvest
Roads
Bank Erosion
Natural Background
Current Load
TMDL Load

# TMDL Implications

- Does *NOT* create or impose new regulations
  - Can help implement existing regulations, mainly for point source surface water discharges

- *Voluntary* for the majority of non-point sources activities, including agriculture
  - Application of water quality improvement practices is a landowner's decision

# Document Outline

**1.0** Project Overview

**2.0** Project Area Description

**3.0** Montana Water Quality Standards

**4.0** Defining TMDLs & Their Components

**5.0 – 8.0** Sediment, Nutrients, Temperature, & Metals TMDL Components (Impaired Waters, Targets, Source Assessment, TMDLs, Allocations)

**9.0** Non-Pollutant Impairments

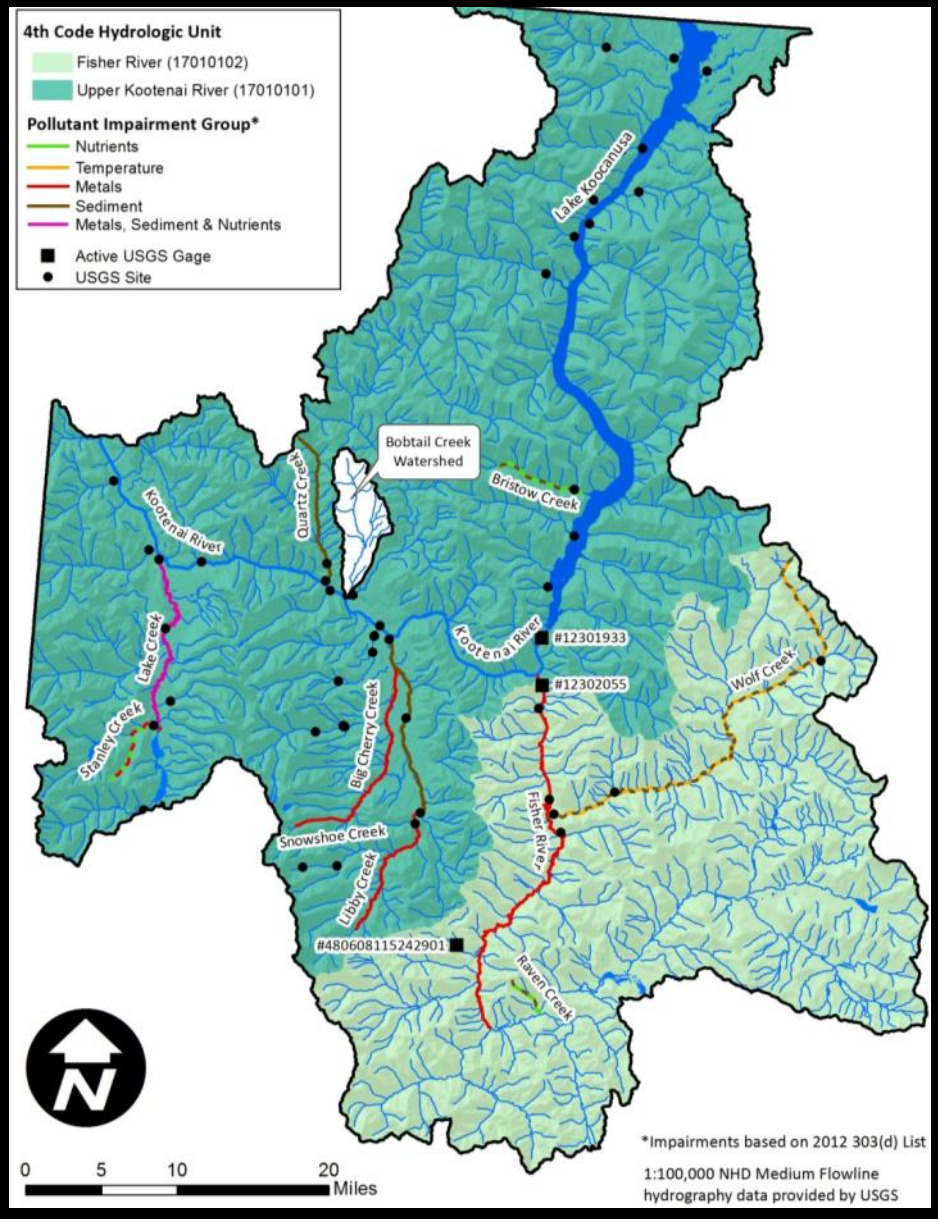
**10.0** Water Quality Improvement Plan

**11.0** Monitoring Strategy

**12.0** Public Comments

# Streams With TMDLs

- **Sediment (4)** – lower Libby, Lake, Raven and Wolf Creeks
- **Nutrients (3)** – Stanley, Lake, and Raven Creeks
- **Temperature (1)** – Wolf Creek
- **Metals (12)** – Big Cherry, Lake, Snowshoe, and Stanley Creeks

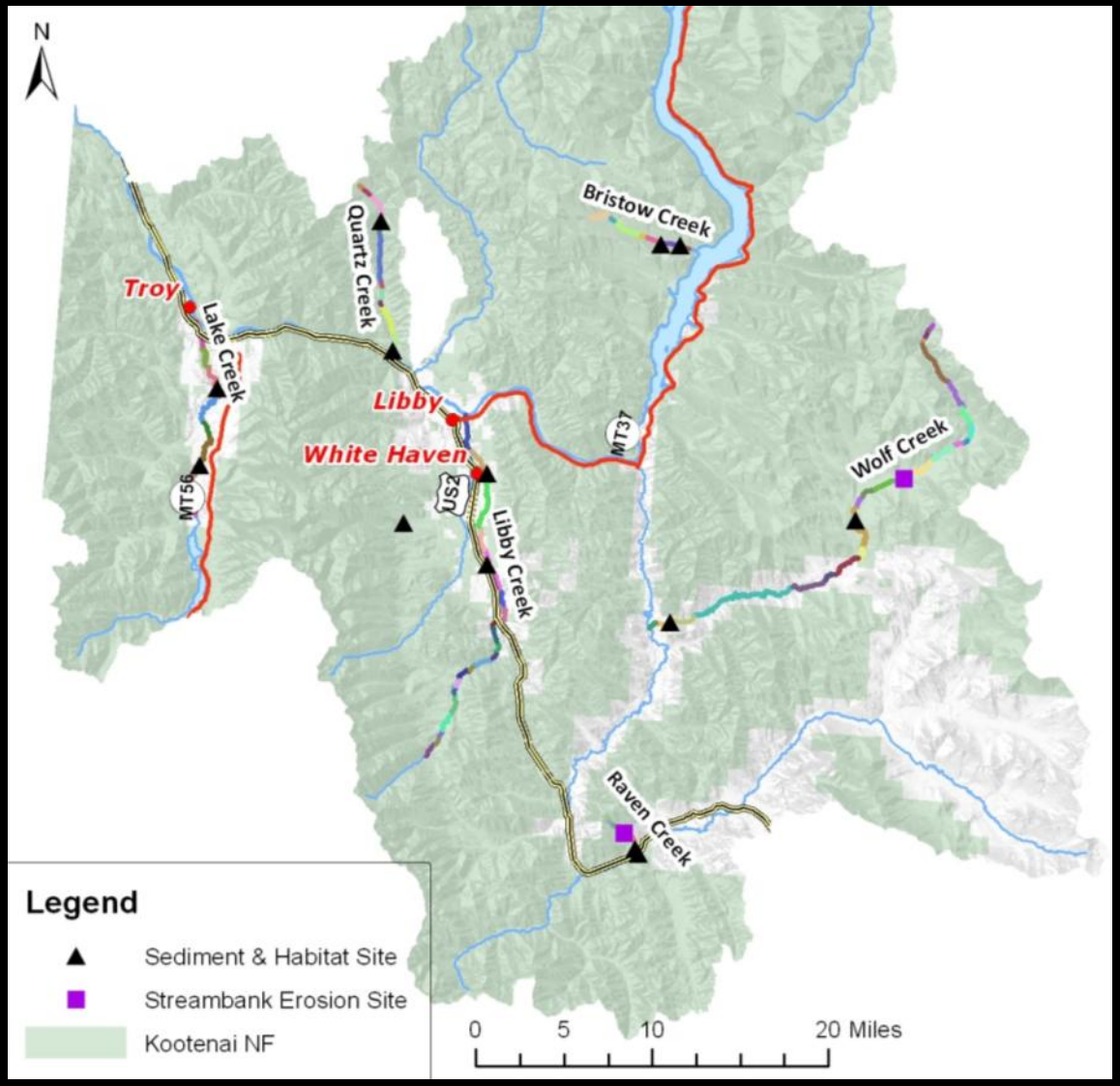


# Sediment, Nutrients, & Temperature TMDLs

Photo Of Lake Creek

Presented by: Lisa Kusnierz, Sediment, Nutrients,
& Temperature Project Manager

# Sediment




## TMDLs

**Four Waterbodies are Impaired Due to Sedimentation & Other Sediment Related Habitat Alterations**

- **Lake Creek**
- **Libby Creek**
- **Raven Creek**
- **Wolf Creek**

**Monitoring was conducted on 15 reaches in 2011**

# Monitoring Data

Collected in-stream data in 2011 at 15 reaches

- Channel form, percent fine sediment, riparian shrub cover, bank erosion, frequency of pools and large woody debris

# Data Evaluation and TMDLs

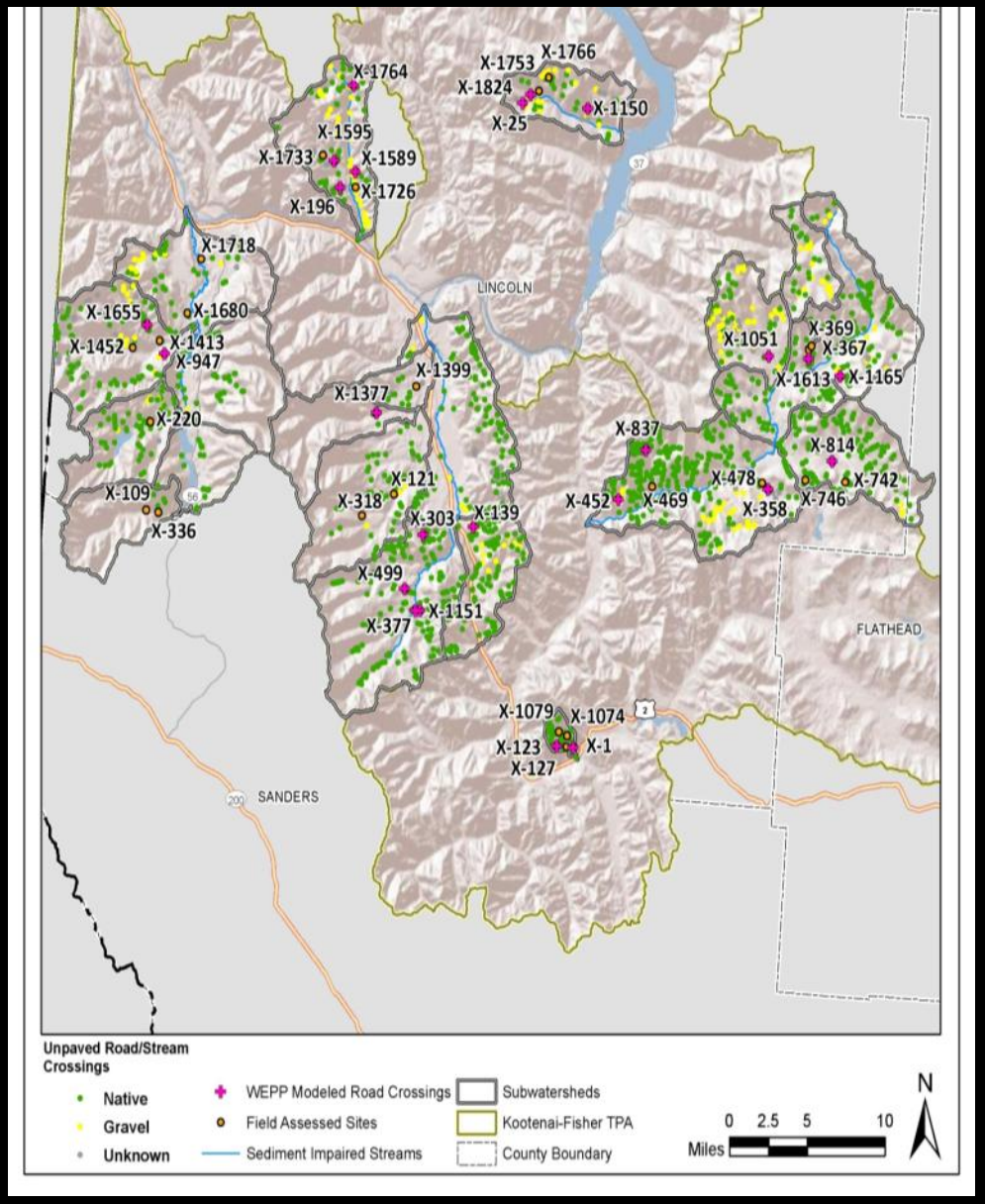
- Targets were developed to translate the narrative standard and evaluate condition of each stream
  - Targets based on reference data
- Sediment TMDLs are based on following all reasonable land, soil, and water conservation practices
  - TMDL is based on a percent reduction approach for all significant sediment sources (point sources, unpaved roads, eroding streambanks, and upland erosion)

# Permitted Point Sources

- 11 permitted point sources (MPDES)
- All within the Libby Creek watershed
- Mine operations, suction dredge, and construction stormwater
- Evaluated permit files and conditions to estimate current load and assign WLA

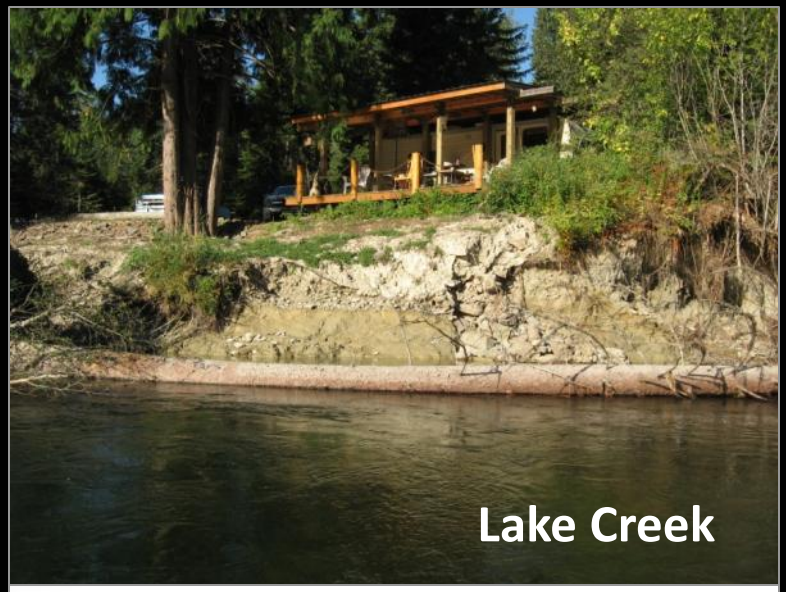
# Unpaved Roads Assessment

- Modeled loads using data collected in 2011
- Reductions estimated based on existing BMPs and potential for additional improvements



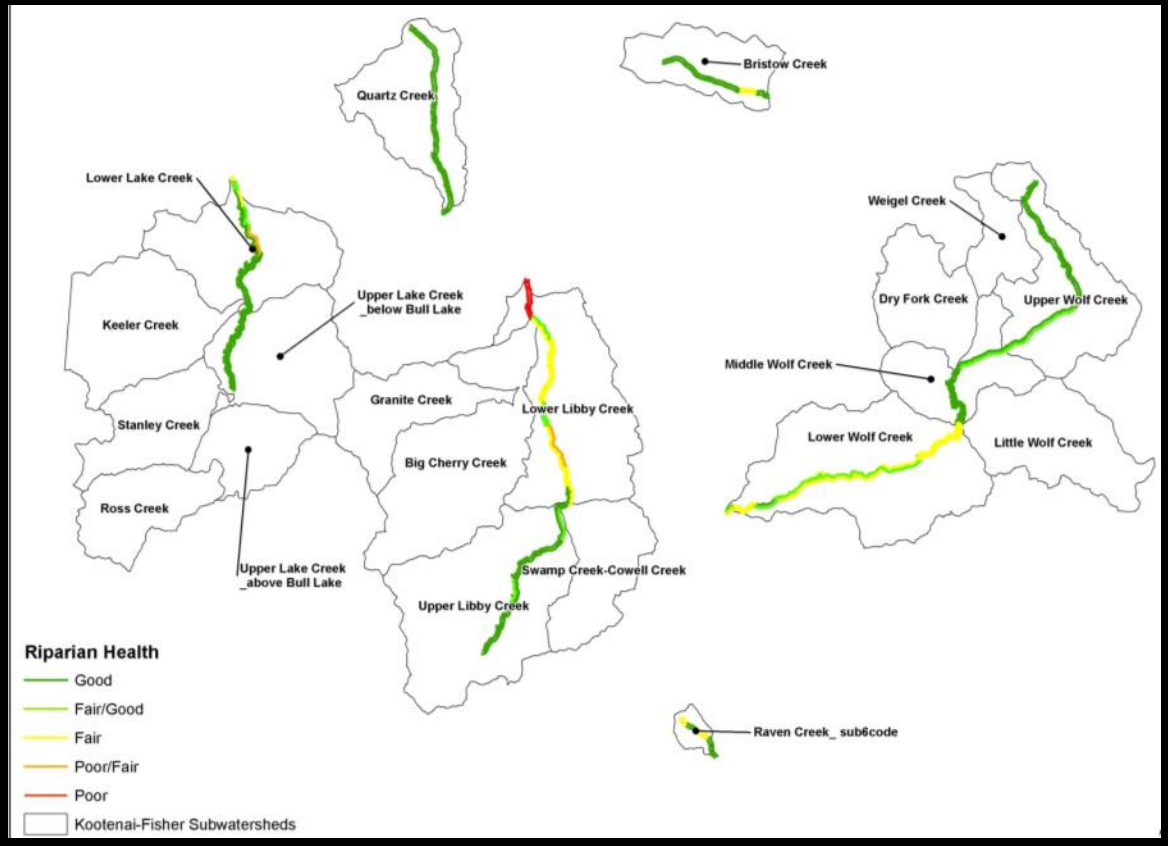
# Streambank Erosion Assessment

- Used 2011 field data to calculate annual erosion
- Estimated the reductions based on the average load for reaches where erosion was dominated by natural sources


Lake Creek


Wolf Creek

# Upland Erosion Assessment




- Modeled existing conditions and then changed ground cover and riparian condition to reflect management changes
- Riparian health improvements comprise more than 98% of the estimated reduction

# Example TMDL: Lower Libby Creek

| Sediment Sources | | Current Estimated Load (Tons/Year) | Total Allowable Load (Tons/Year) | Load Allocations (% reduction) |
|---|---|---|---|---|
| Roads | | 6.9 | 3.4 | 51% |
| Streambank Erosion | | 4,938 | 3,498 | 29% |
| Upland Sediment Sources | | 876 | 709 | 19% |
| Point Source | Montanore Mine (MT0030279) | 0 | 24 | 0% |
| | Suction Dredge (MTG370000) | 0 | 0 | 0% |
| | Construction Stormwater (MTR100000) | 0 | 0 | 0% |
| **Total Sediment Load** | | **5,821** | **4,234** | **27%** |

# Nutrients

## TMDLs

Three waterbodies:

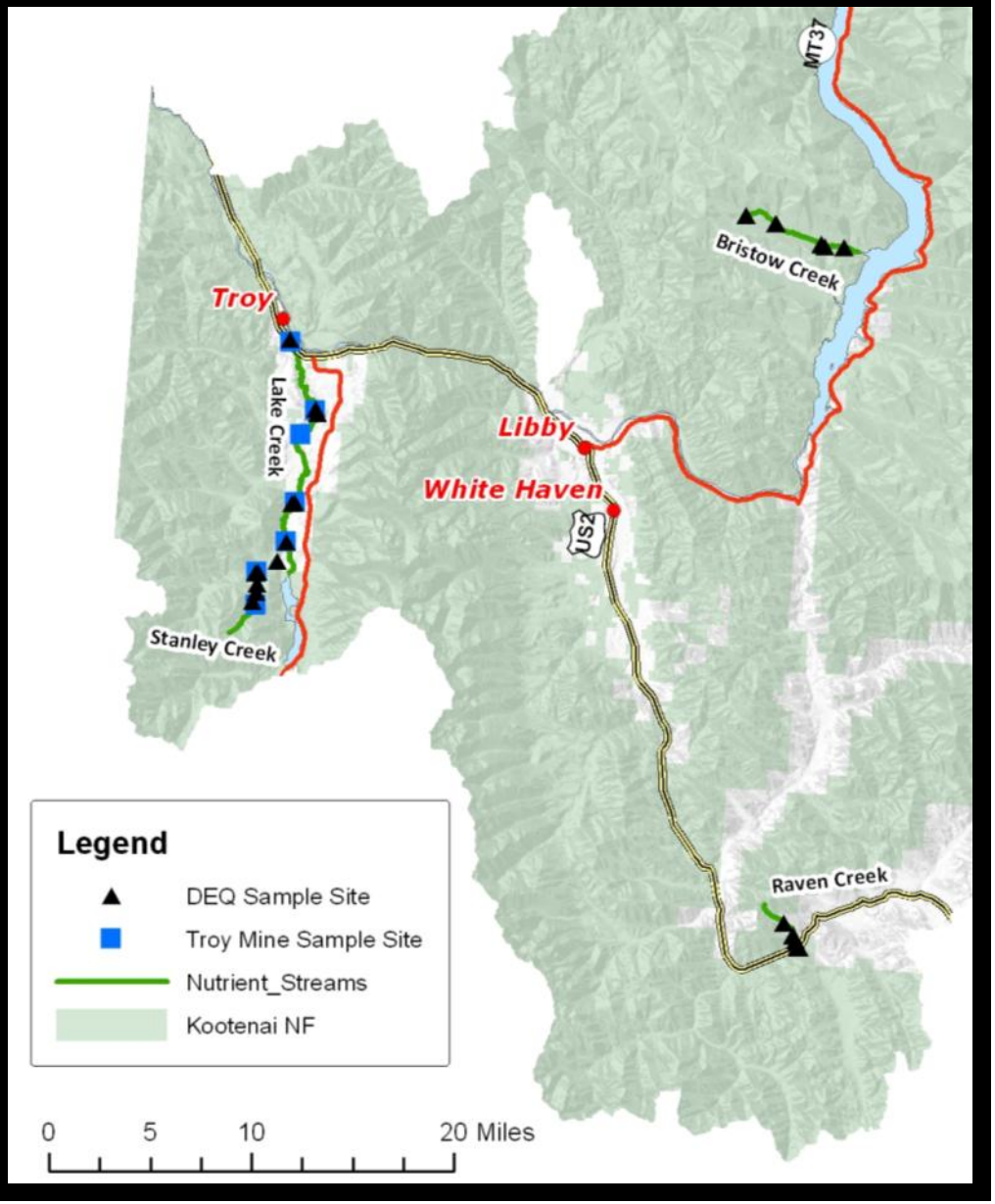
-Lake Creek ($NO_3$)

-Raven Creek (TP)

-Stanley Creek ($NO_3$)

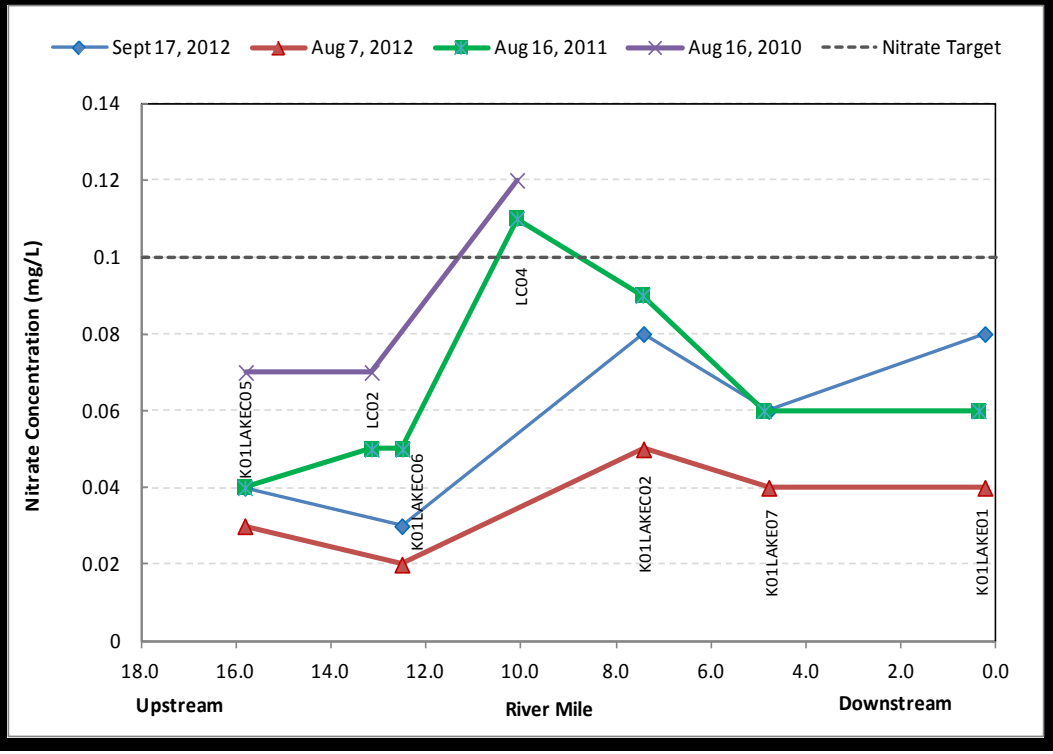
## Monitoring

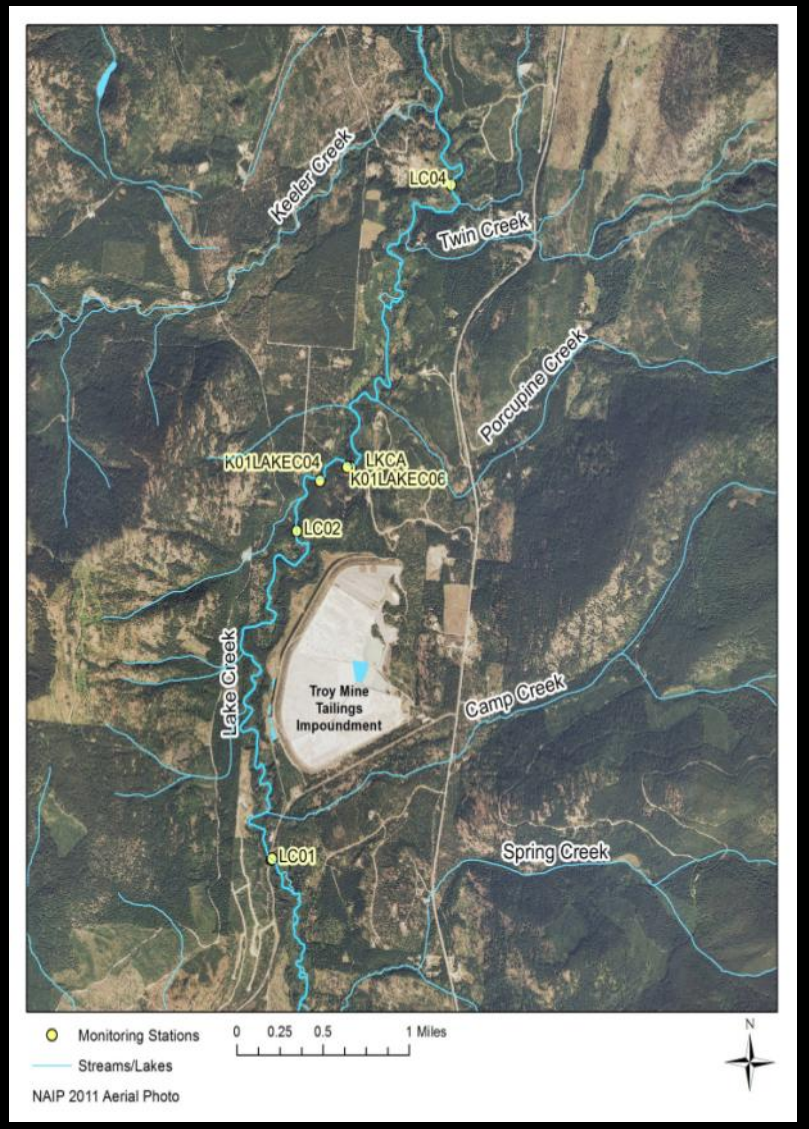
- Nutrient and biological data collected in 2011/2012
- Data also obtained from Troy Mine for Lake and Stanley creeks



# Source Assessment

- Water quality data, land use distribution, and literature used for source assessment
- There are no nutrient point sources



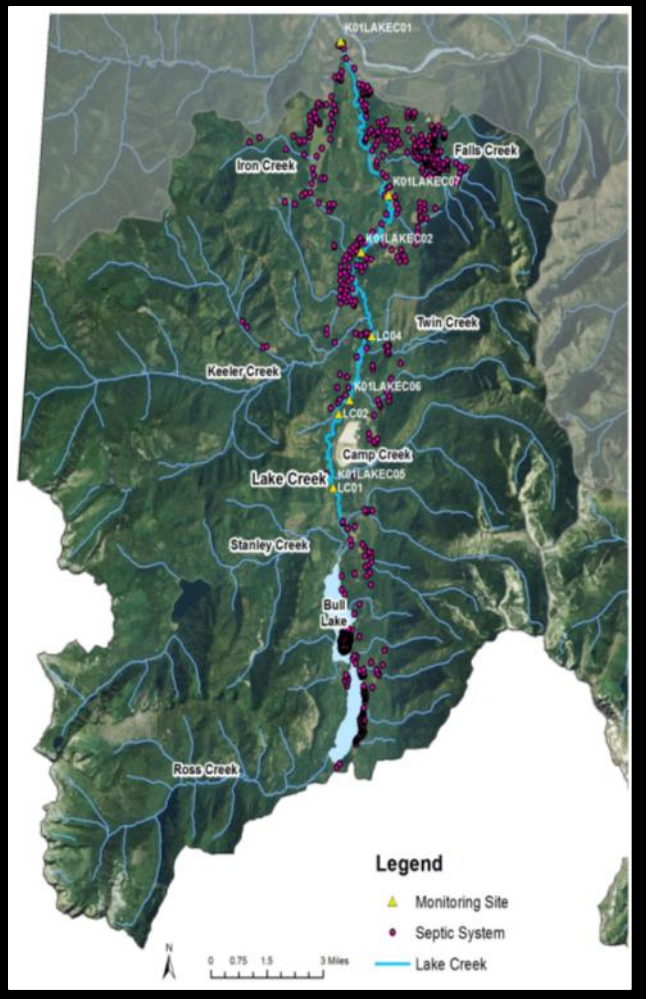
# Potential Sources & Allocations

Stanley: Timber harvest & mining

Lake: Timber harvest, mining, septic

Raven: Sources of sediment

- Allocations to natural background and a composite of human sources



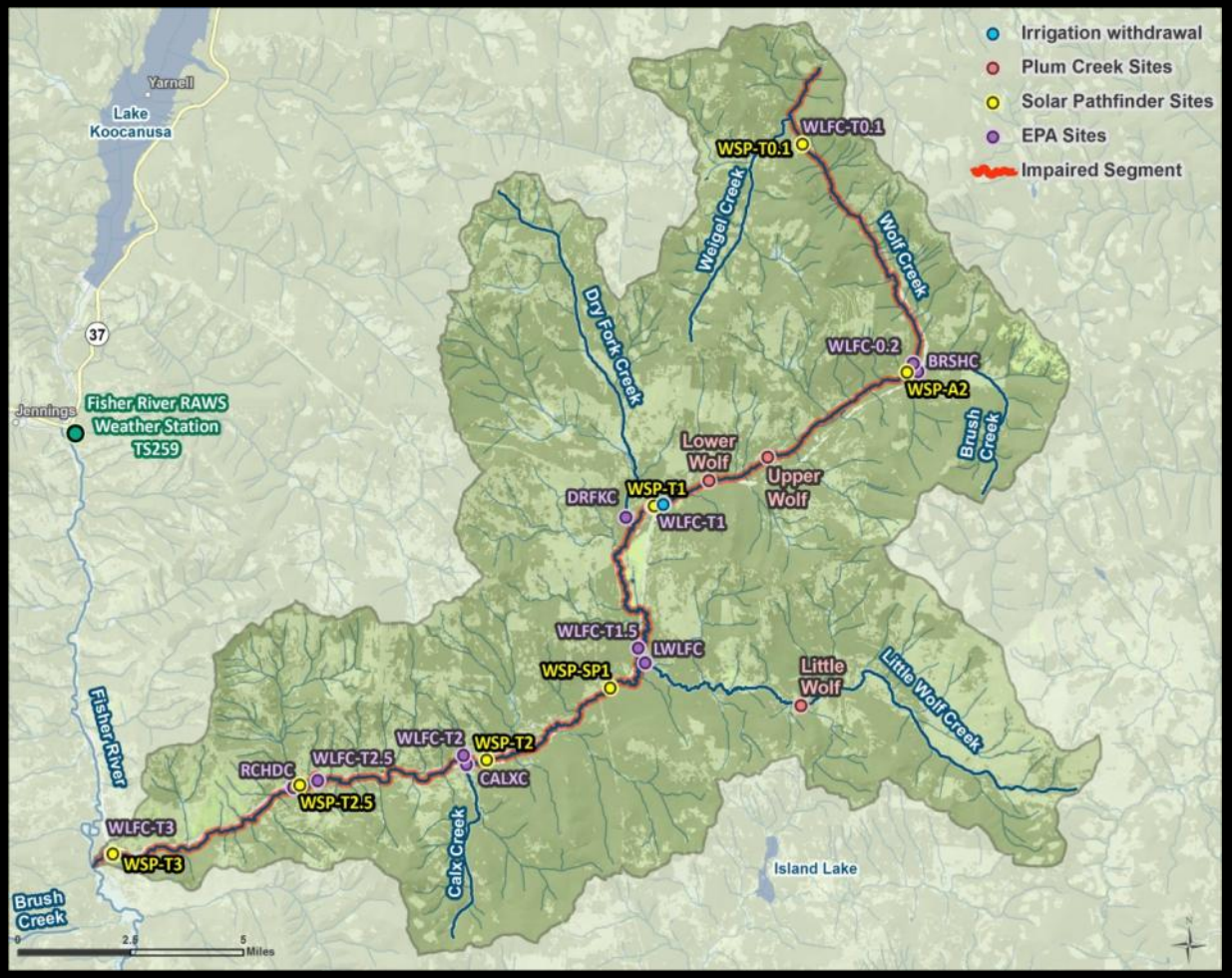
# Example $NO_3$ TMDL: Lake Creek

| Allocation | Source Category | Current Load (lbs/day) | % Reduction | Allocation (lbs/day) |
|---|---|---|---|---|
| **Load Allocation** | Natural Background | 4.0 | 0% | 4.0 |
| | Other sources including septics, timber harvest, and mining | 16.7 | 0% | 16.7 |
| | Troy Mine Tailings Impoundment | 40.8 | 43% | 23.3 |
| **TMDL** | **All Sources** | **61.5** | **28%** | **44.0** |

**81.4 cfs * 0.1 mg/L target * 5.4 (conversion factor) = 44 lbs $NO_3$/day**

# Temperature: Wolf Creek

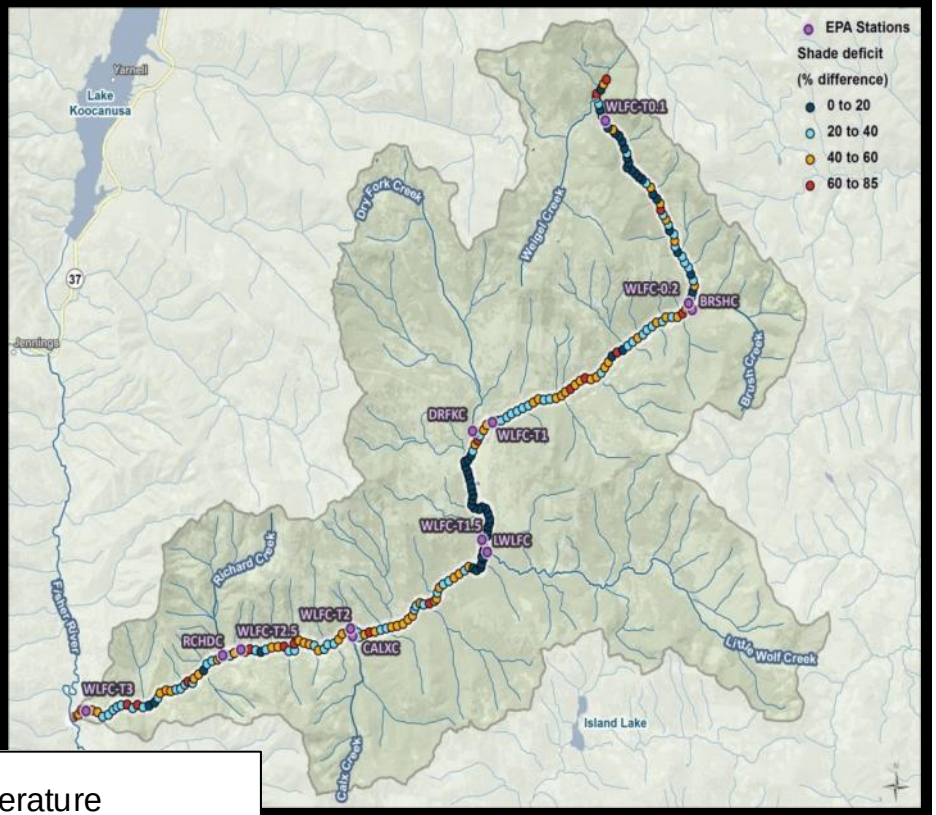
- 7 loggers on Wolf Creek and at 5 tributary sites
- 3 loggers deployed by Plum Creek in 2012
- Flow collected at all sites and shade measurements on Wolf Creek

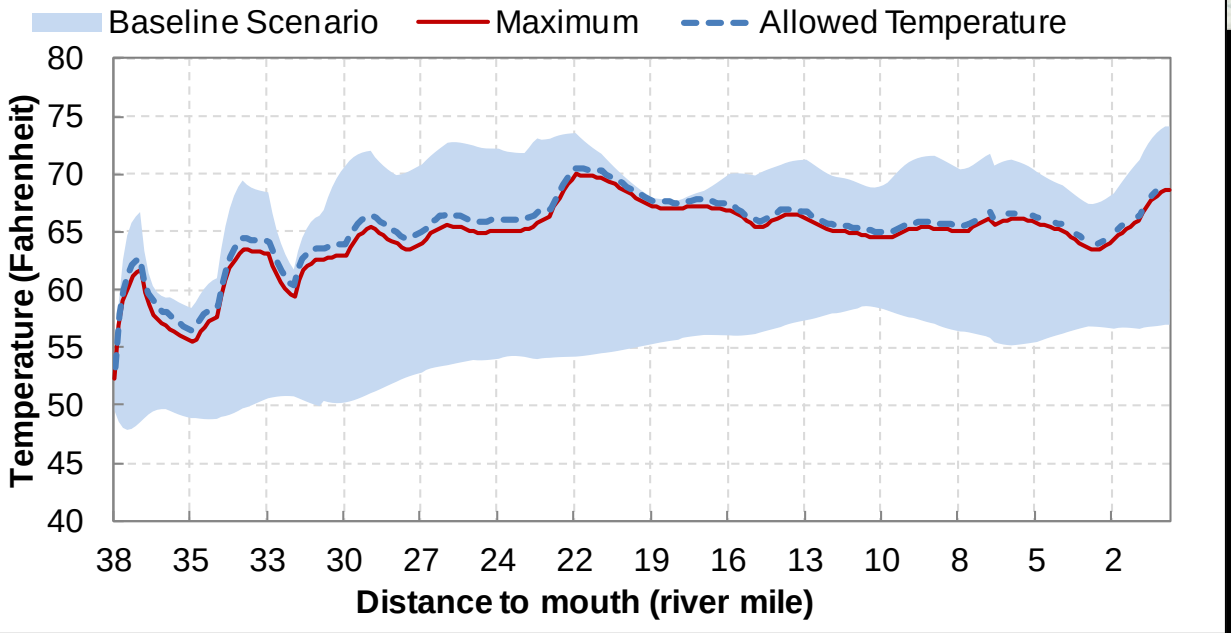


# Temperature Standard & Model Framework

- The standard allows a human caused 0.5 or 1°F change from the naturally occurring temperature
- Targets for shade, width/depth ratio
- Modeled the existing temperature and 3 scenarios:
  1) improved shade; 2) improved water conservation; and 3) improved shade & water conservation [naturally occurring]
  - Comparison between scenarios shows level of impairment and improvement needed

# Scenario Results




Potential decrease between naturally occurring and existing 0.72°F – 7.82°F, with an average decrease of 4.6°F

# Numeric and Surrogate TMDL

| Source Type | Modeled Existing Load (kcal/sec) | TMDL/Load Allocation (kcal/sec) | Percent Reduction Needed |
|---|---|---|---|
| Natural and human sources that influence temperature | 6,229 | 5,483 | 12% |

| Source Type | Surrogate Allocation |
|---|---|
| Land uses and practices that reduce riparian health and shade provided by near-stream vegetation along Wolf Creek. | • Improve to and maintain a 50 foot buffer with medium density trees or any vegetation providing equivalent effective shade |
| Land uses and practices that result in the over-widening of the stream channel such that widths are increased, depths are decreased, and thermal loading is accelerated | No increase in average width or width/depth ratios due to human-caused sources<br>• Where bankfull width < 30ft, a width/depth ratio $\leq$ 21<br>• Where bankfull width > 30ft: a width/depth ratio $\leq$ 32 |
| Inefficient consumptive water use | • Application of all reasonable water conservation practices |
| **Surrogate TMDL** | • **Application of all reasonable land, soil, and water conservation practices for human sources that could influence stream temperatures. This primarily includes those affecting riparian shade, channel width, and in-stream flow.** |

# Metals TMDLs for the Kootenai-Fisher Project Area


Photo of Troy Mine

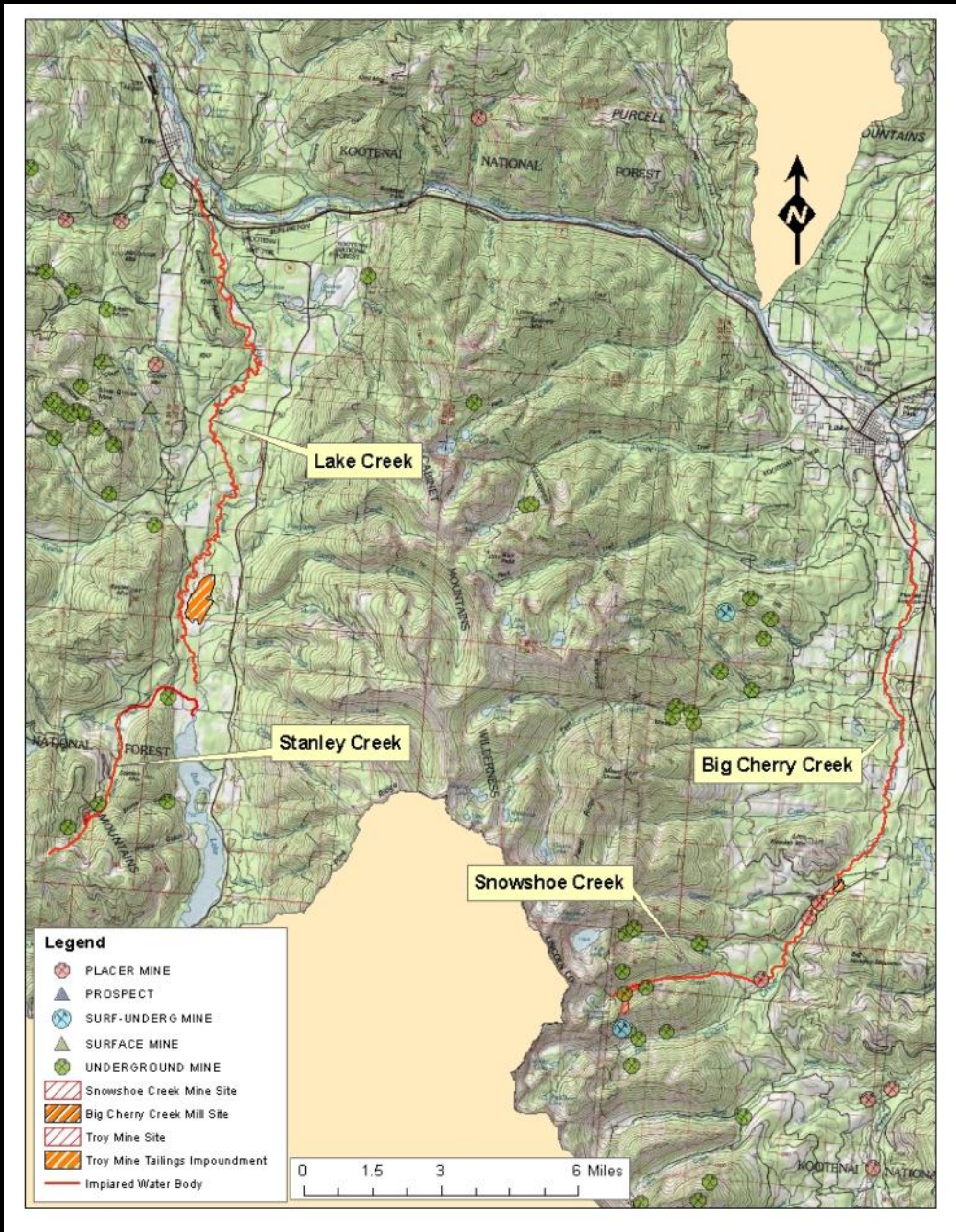
# Metal TMDLs

## Stanley Creek
- Copper
- Lead
- Zinc

## Lake Creek
- Copper
- Lead

## Snowshoe Creek
- Arsenic
- Cadmium
- Lead
- Zinc

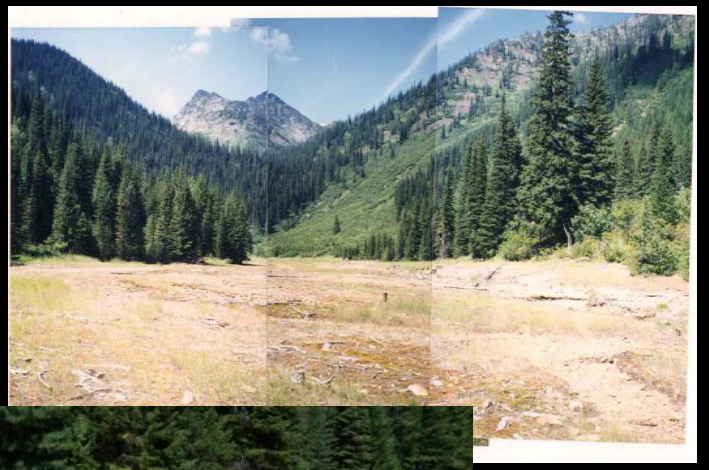
## Big Cherry Creek
- Cadmium
- Lead
- Zinc



# Metals Sources

## Snowshoe Creek

- Reclaimed Snowshoe mine site
- Stream side tailings downstream of mine site
- Several inactive/abandoned mines
  - St. Paul,
  - Texas Ranger



## Big Cherry Creek

- Big Cherry Creek mill site
- Copper Reward, Seattle, Silver Tip and Fairbault Mines (Headwaters of Big Cherry Creek)
- Big Sky and Missouri (Leigh Creek)
- Various placer operations
- Loading from Snowshoe Creek

# Metals Sources

## Stanley Creek

- Land disturbances associated with the Troy Mine, and other historical mining operations
  - metals loading associated sediment production, i.e. high flows, and land disturbance contributing sediment
- Several small inactive load mines: Daniel Lee and Blue Bird

## Lake Creek

- Numerous abandoned  underground lode mines
  - Copper Creek watershed
  - North Fork watershed
- Troy Mine tailing impoundment
- Effects of metals loading from Stanley Creek

# Data Collection & Impairment Determination

- Sampling conducted in 2009- 2012
- Sampled and assessed for: Aluminum (Al) Arsenic(As), Cadmium (Cd), Copper (Cu), Iron (Fe), Lead (Pb), Selenium (Se), Silver (Ag) and Zinc (Zn)
- High and low flow conditions
- Updated DEQ assessment:
  - Even with limited data:
    - Some stream showed no metals impairment conditions (Fisher River and Libby Creek)
    - Some streams indicated impairment for metals (not necessarily for original listings)
    - Addition of new metals/waterbody combinations to impairment list
      - Big Cherry (Cd, Pb)
      - Snowshoe (As, Pb)
      - Stanley Creek (Pb, Zn)
    - Elimination of other metals/waterbody combinations
      - Lake Creek (Cd, Hg, Zn)
  - Beneficial uses found to be impaired include:
    - Aquatic Life Support
    - Drinking Water
    - Agriculture
    - Recreation

# Numeric Water Quality Standards

**Copper Example**

- Fixed Numeric: Human Health: 1,300 µg/l
- Variable Numeric

  Aquatic Life: (varies with hardness)

  At 25 mg/L hardness-
  - Acute: 3.79 µg/l (do not exceed)
  - Chronic: 2.85 µg/l (96 hour mean)

  At 400 mg/L hardness-
  - Acute: 14.0 µg/l (do not exceed)
  - Chronic: 9.33 µg/l (96 hour mean)

# Metals TMDL Development Triggers

- Greater than 10 % of recent analytical results exceed Chronic Aquatic Life (CAL) targets.
- At least one analytical result is greater than twice the Acute Aquatic Life (AAL) target.
- At least one analytical result exceeds the Human Health (HH) target.
- Water column metals concentrations are elevated under both high and low flows regimes and sediment metals concentrations greatly exceed (more than 2X) Probable Effects Level (PELs).

# TMDL & Allocations

TMDL =

∑ Load Allocations (background) + ∑ Wasteload Allocation (mining load)

- Background load (naturally occurring conditions in the watershed)
  - Calculated from median high and low flow data from unaffected streams in the Kootenai Fisher project area

- Mining loads are composite, to account for all mines, mining activity and associated disturbances (mine tailings, open adits, roads etc.)

# Example TMDLs

| Big Cherry Creek: Example Metals TMDLs and Allocation | | | | | |
|---|---|---|---|---|---|
| **Metal** | **Flow** | **$LA_{nat}$** | **$WLA_{MS}$** | **Existing Load** | **TMDL** |
| **Cadmium** | High flow | 0.0324 | 0.0081 | 0.320 | 0.0405 |
| | Low flow | 0.0018 | 0.0036 | 0.038 | 0.0054 |
| **Lead** | High flow | 0.203 | 0.016 | 1.701 | 0.219 |
| | Low flow | 0.011 | 0.024 | 0.031 | 0.035 |
| **Zinc** | High flow | 4.05 | 10.94 | 24.30 | 14.99 |
| | Low flow | 0.22 | 1.88 | 2.24 | 2.10 |
| **Units are lbs/day** | | | | | |

# Watershed-Wide Metals Reductions

- Arsenic 0% - 23%
- Cadmium 86%-97%
- Copper 20%-80%
- Lead 0% - 94%
- Zinc 0% - 91%

# Implementation Strategy & Next Steps


Presented by: Christina Staten, Project Coordinator

# TMDL Implementation

- A completed TMDL provides information on water quality problems and strategies to reduce pollutants by changing land and water management activities
- The TMDL document provides a basis for action, but TMDLs are not self-implementing
- It is up to local stakeholders, organizations, and government agencies to determine how to best use the information and implement a restoration strategy

# Implementation Strategy

**Sediment , Nutrient, and Temperature Goals :**

- Improve and restore riparian corridors
- Improve land use management practices to reduce pollutant loading while still providing viable and sustainable economic growth

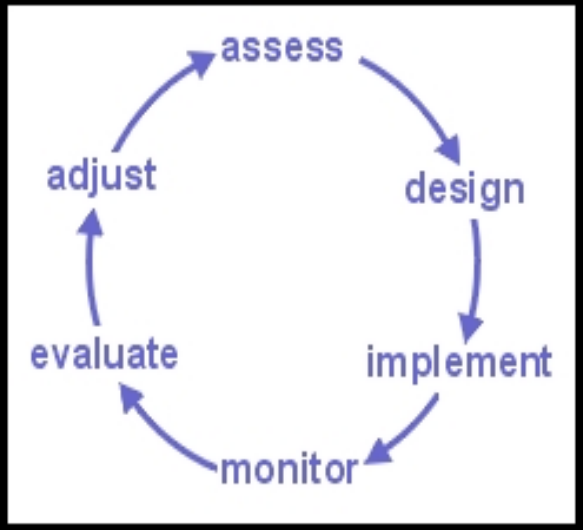
**Metals Goals:**

- Prevent contaminated sediment and waste rock/ tailings from migrating into adjacent surface waters
- Reduce or eliminate concentrated runoff and discharges that generate sediment and/or heavy metals contamination to adjacent surface waters and groundwater
- Minimize erosion of mineralized soils

# TMDL Implementation

## Adaptive Management Approach

An adaptive management approach works in cooperation with monitoring, and as new information is collected, it allows for adjustments to restoration goals or pollutant targets, TMDLs, and/or allocations



# Next Steps

## Development of the Watershed Restoration Plan

- Identify priorities
- Refine source assessment


## Seek Funding to Implement Projects

- Potential Funding Sources:
  - Federal 319 funds administered by DEQ
  - FWP Future Fisheries Improvement Program
  - DNRC Watershed Planning and Assistance grants
  - NRCS Environmental Quality Incentives Program (EQIP)

# DEQ's Watershed Protection Program

Helps With or Provides:

- Technical Assistance
- Monitoring Assistance
- Funding
- TMDL Implementation Evaluations

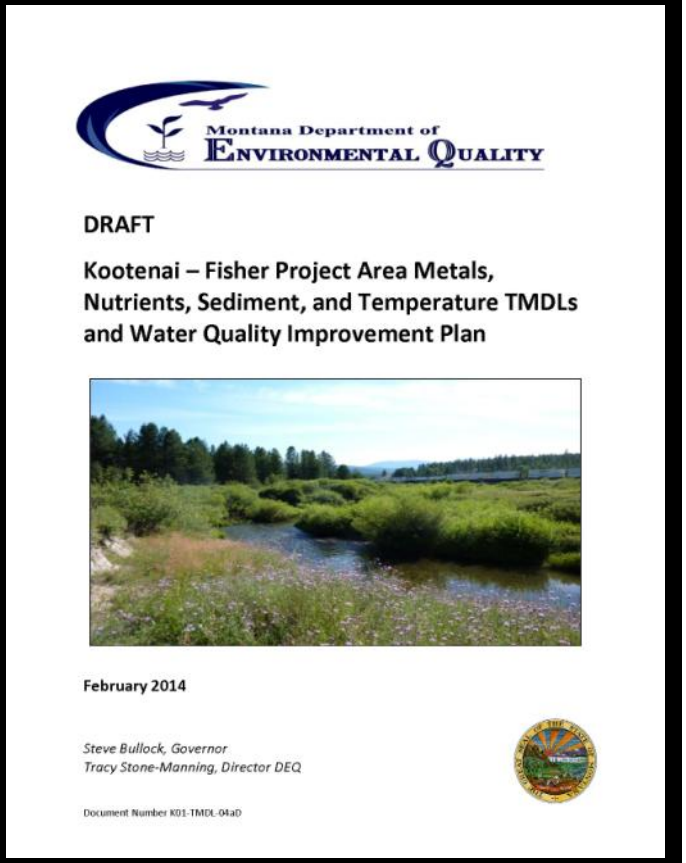

Robert Ray, Section Supervisor:

rray@mt.gov, 444-5319

# Public Comment Period

- **February 3 – March 4**
- Document available at:
  Libby and Troy Public Libraries and DEQ website

  http://deq.mt.gov/pubcomm.mcpx
- Submit comments in writing here, via mail, or electronically




Lou Volpe
LVolpe@mt.gov
406-444-6742

Lisa Kusnierz
Kusnierz.Lisa@epa.gov
406-457-5001