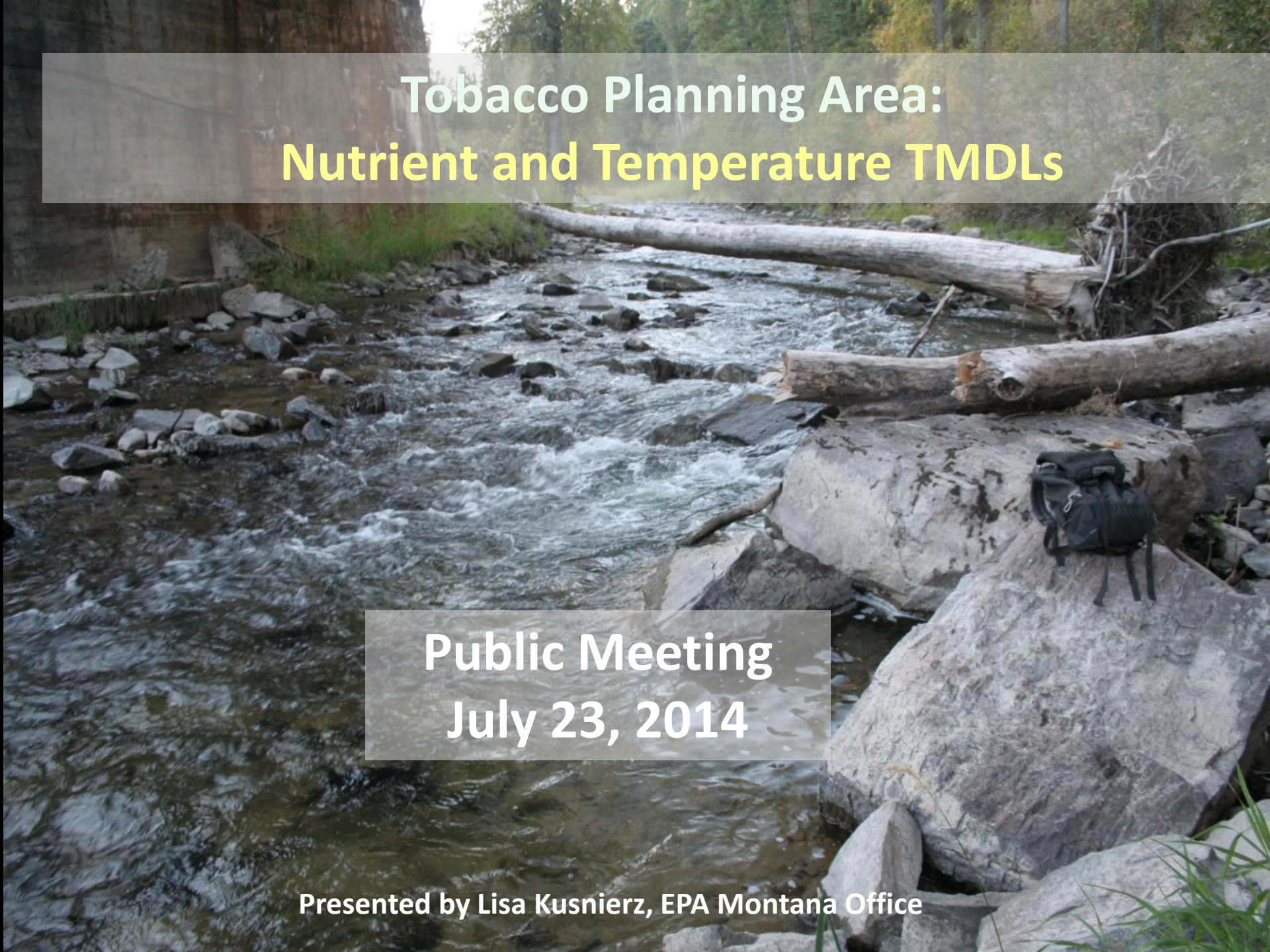


Tobacco Planning Area:
Nutrient and Temperature TMDLs

Public Meeting
July 23, 2014

Presented by Lisa Kusnierz, EPA Montana Office

Background

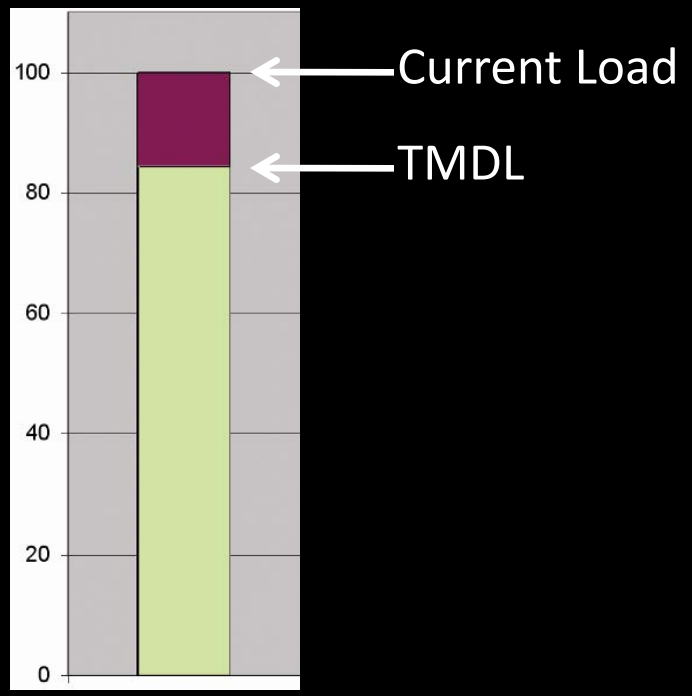
- Waterbodies are classified by beneficial use
  - Drinking Water, Agriculture, Recreation, Aquatic Life
- We use criteria to assess waterbodies
  - Numeric Criteria
  - Narrative Criteria
- Streams and lakes not supporting their beneficial use(s) are impaired and require a TMDL
  - Montana State Law and Federal Clean Water Act

What is a TMDL?

- Total Maximum Daily Load is the amount of pollutant a waterbody 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)



What is a TMDL?

- TMDLs are specific to a waterbody and a pollutant, so a single waterbody may have multiple TMDLs
  - Lime Creek has 2: Total Phosphorus, Total Nitrogen

- The document itself is sometimes referred to as a TMDL
  - Tobacco Planning Area TMDL

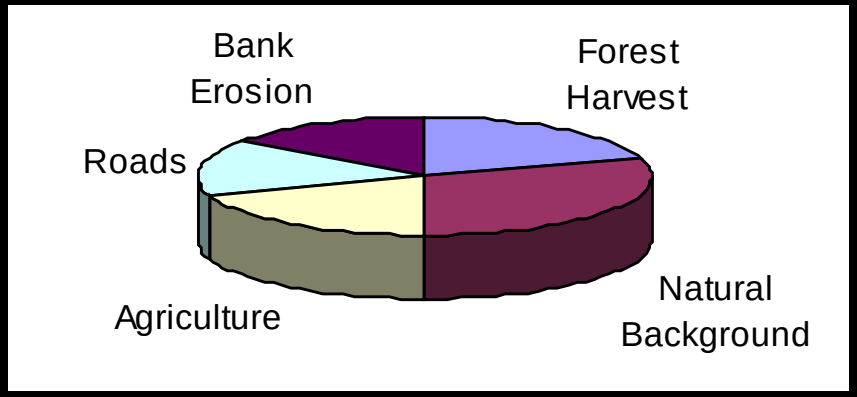
Pollutant Groups

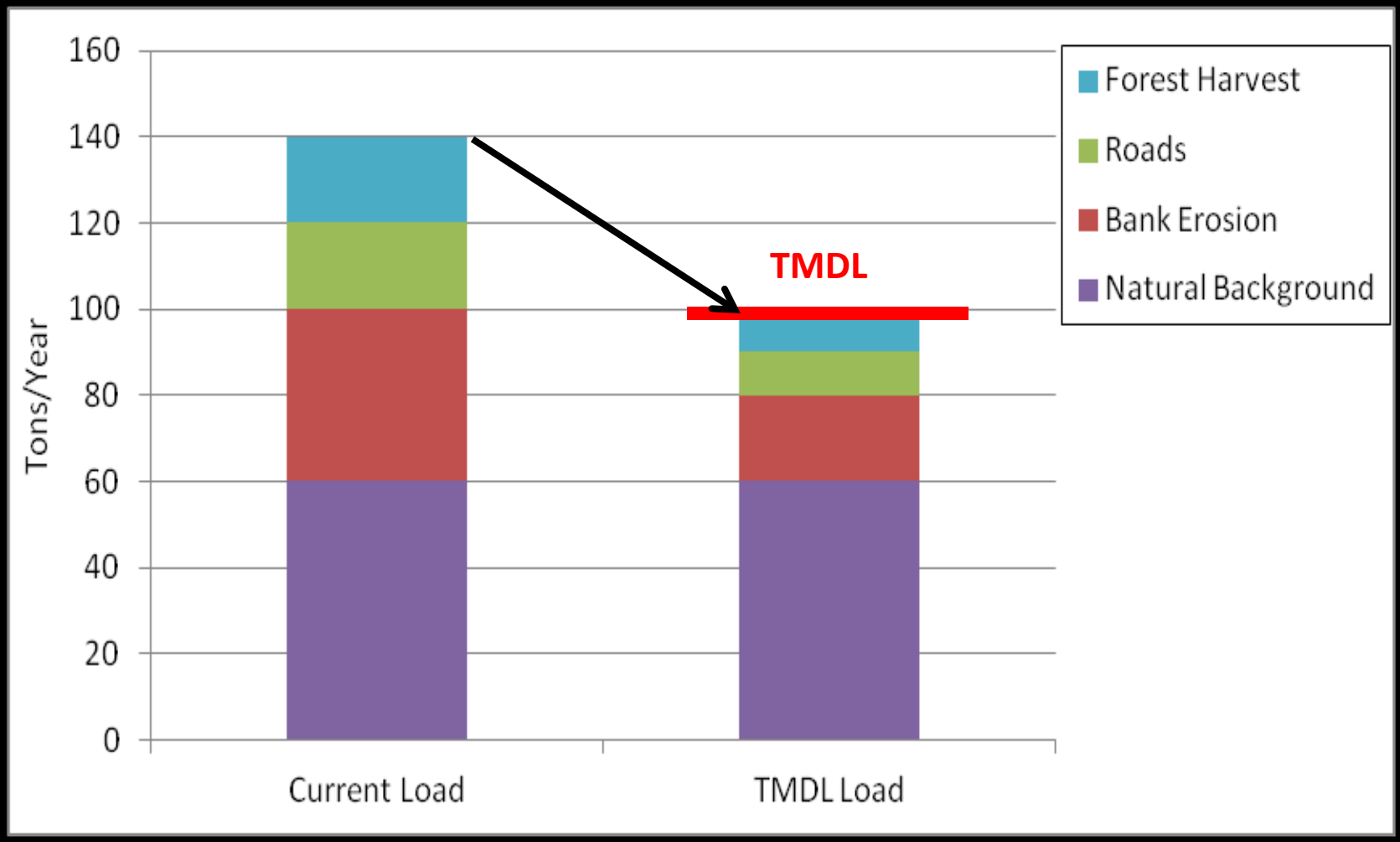
TMDL Development Steps

- 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 best management practices



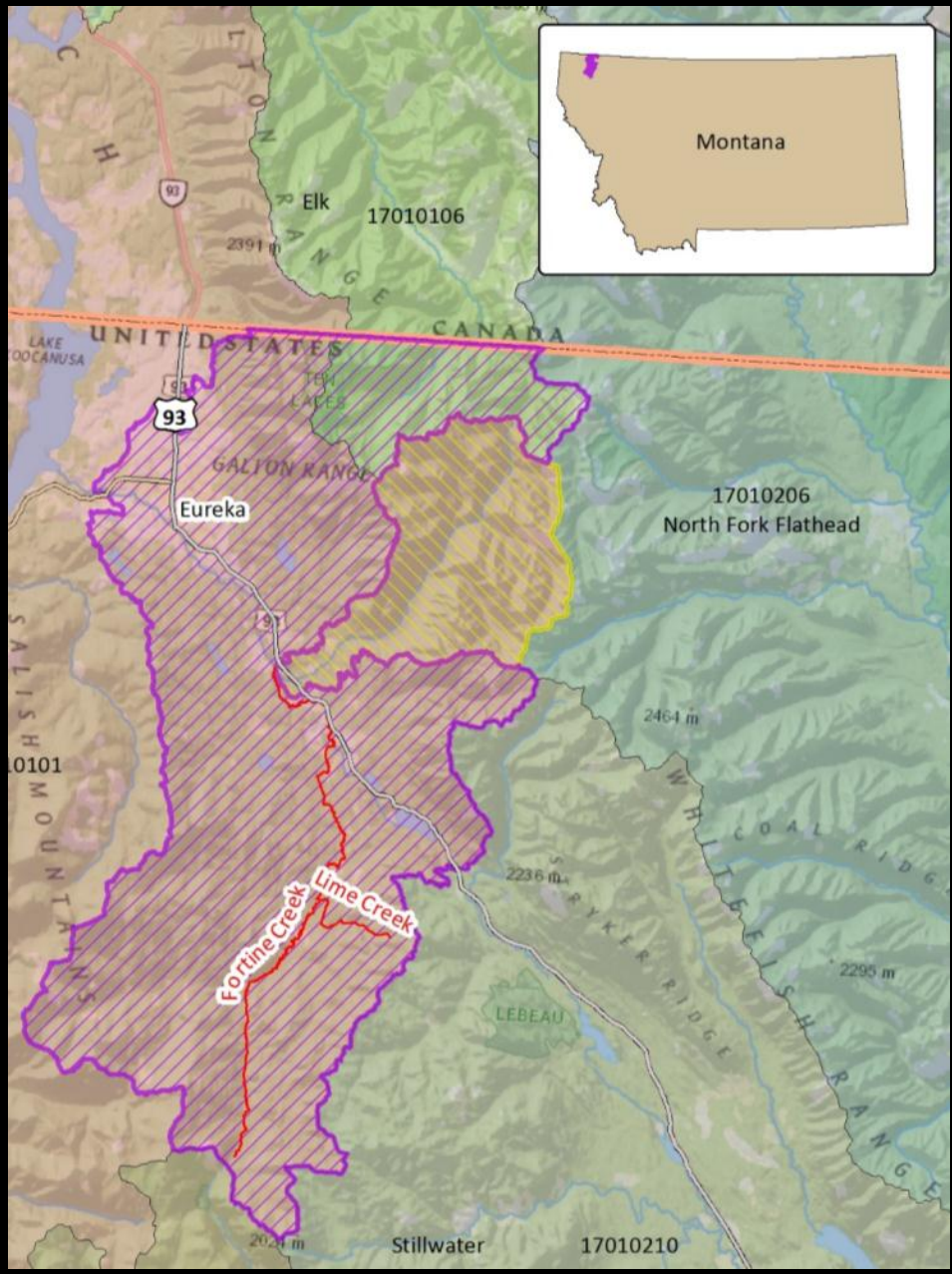

160
140
120
100
80
60
40
20
0
Tons/Year
TMDL
Forest Harvest
Roads
Bank Erosion
Natural Background
Current Load
TMDL Load

Document Layout

1. Introduction
2. Watershed Description
3. Water Quality Standards Overview
4. TMDL Process Overview
5 - 6. Separate Sections for Temperature & Nutrients
   -Impaired waters, targets, source assessment, TMDLs/allocations
7. Water Quality Improvement Plan & Monitoring Strategy

TMDL Scope

- **Temperature:**
  Fortine Creek
- **Nutrients:**
  Lime Creek
- **Sediment:**
  Completed in 2005/2011



Lime Creek Nutrients

- Growing season sampling in 2007/2008 and 2012/2013
- Includes water and biological data

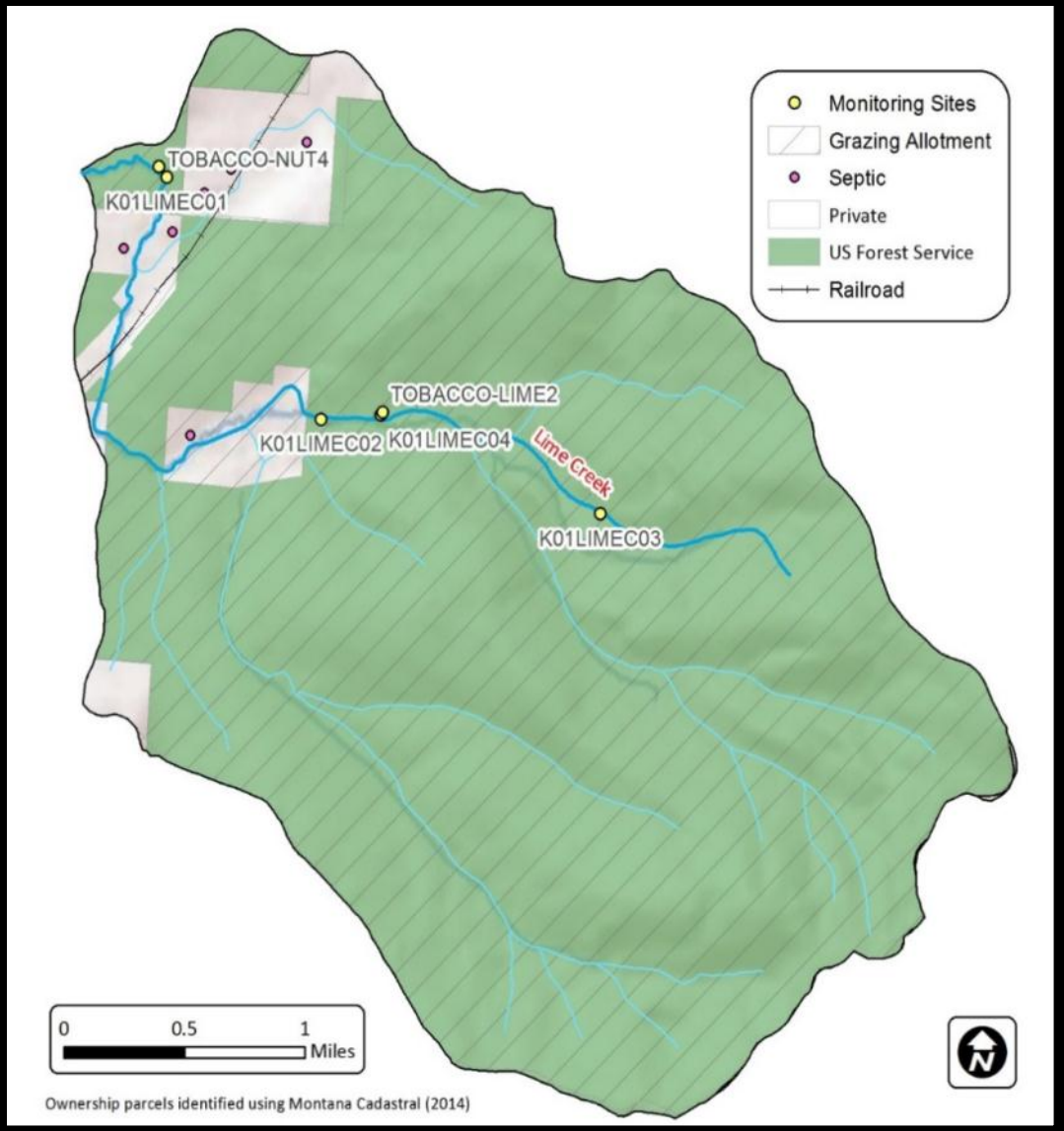
Data

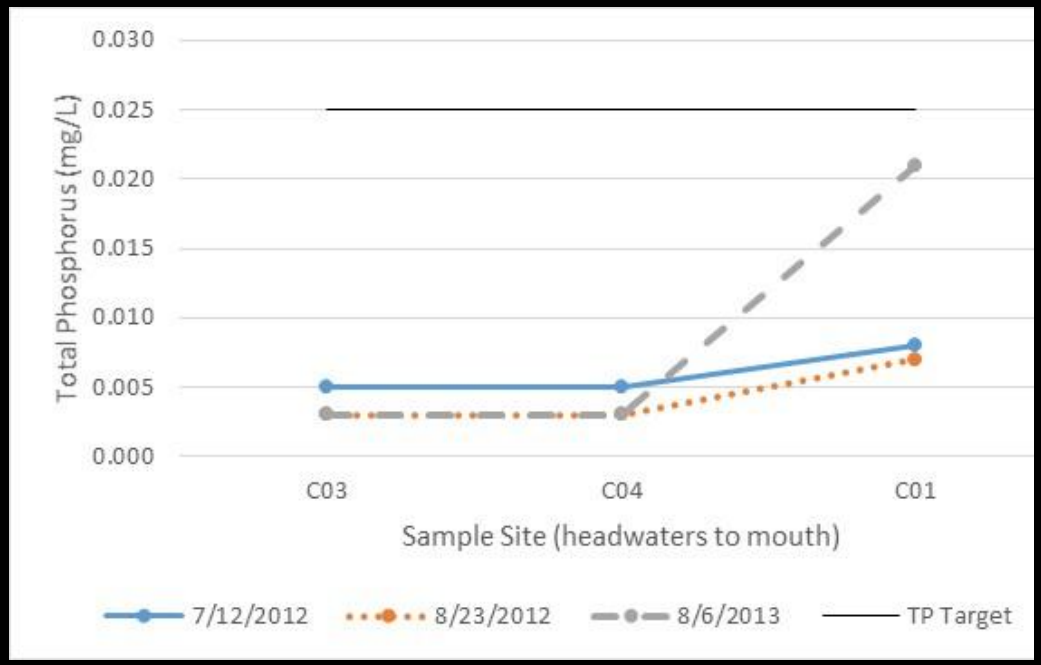
Nutrient Parameter	Sample Timeframe	Sample Size	Target	Min	Max	Median
NO_3+NO_2, mg/L	2003-2013	13	0.100	<0.005	0.020	0.005
TN, mg/L	2003-2013	12	0.275	<0.04	**0.91**	0.10
TP, mg/L	2003-2013	13	0.025	<0.003	0.024	0.007
Chlorophyll-a, mg/m²	2012	3	150	<50[2]	1.1	<50[2]
AFDM, g/m²	2012	3	35	<35[2]	**118**	<35[2]
Macroinvertebrate HBI	2003-2012	4	4.0	1.9	**4.6**	3.6
Periphyton	2003-2012	5	50	25	**68**	57

Nutrient	Sample Size	Target Value (mg/L)	Target Exceed-ances	Binomial Test Result	T-test Result	Chl-a Test Result	AFDM Test Result	Macro Test Result	Peri-phyton	TMDL Required?
NO_3+NO_2	13	0.10	0	PASS	PASS	Pass	**Fail**	**Fail**	**Fail**	NO
TN	12	0.275	2	**FAIL**	PASS					**YES**
TP	13	0.025	0	PASS	PASS					**YES**

Source Assessment

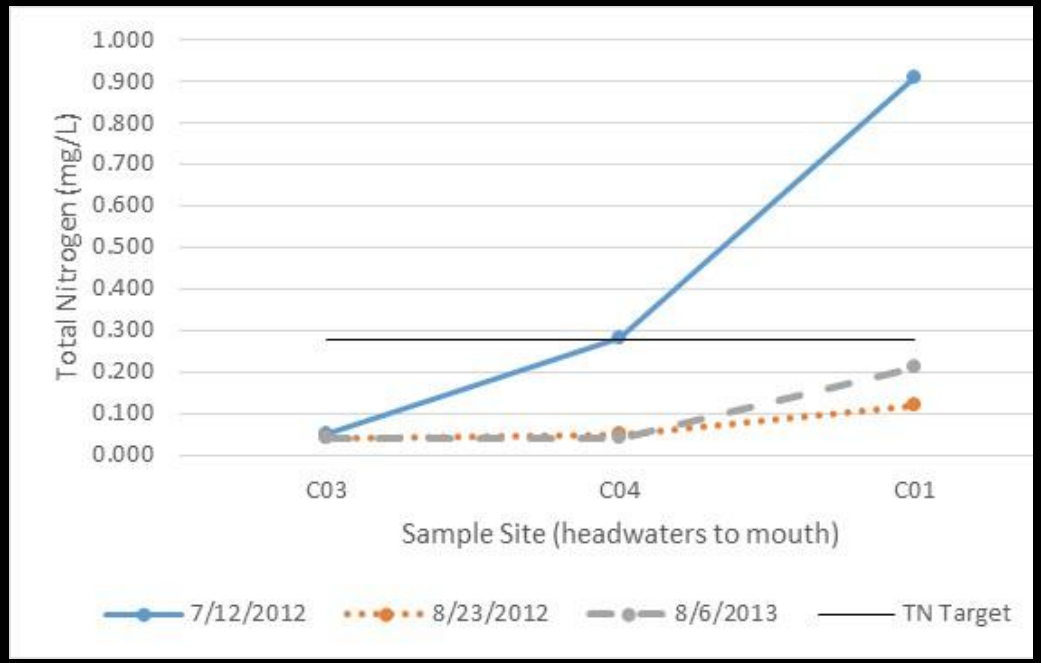
- Water quality data, land use distribution, and literature used for source assessment
- There are no nutrient point sources
- Potential sources: grazing, timber harvest, development, natural





Source Assessment & Allocations

- Most loading near mouth
- Area of mixed land use
- Allocations to natural background and a composite of human sources

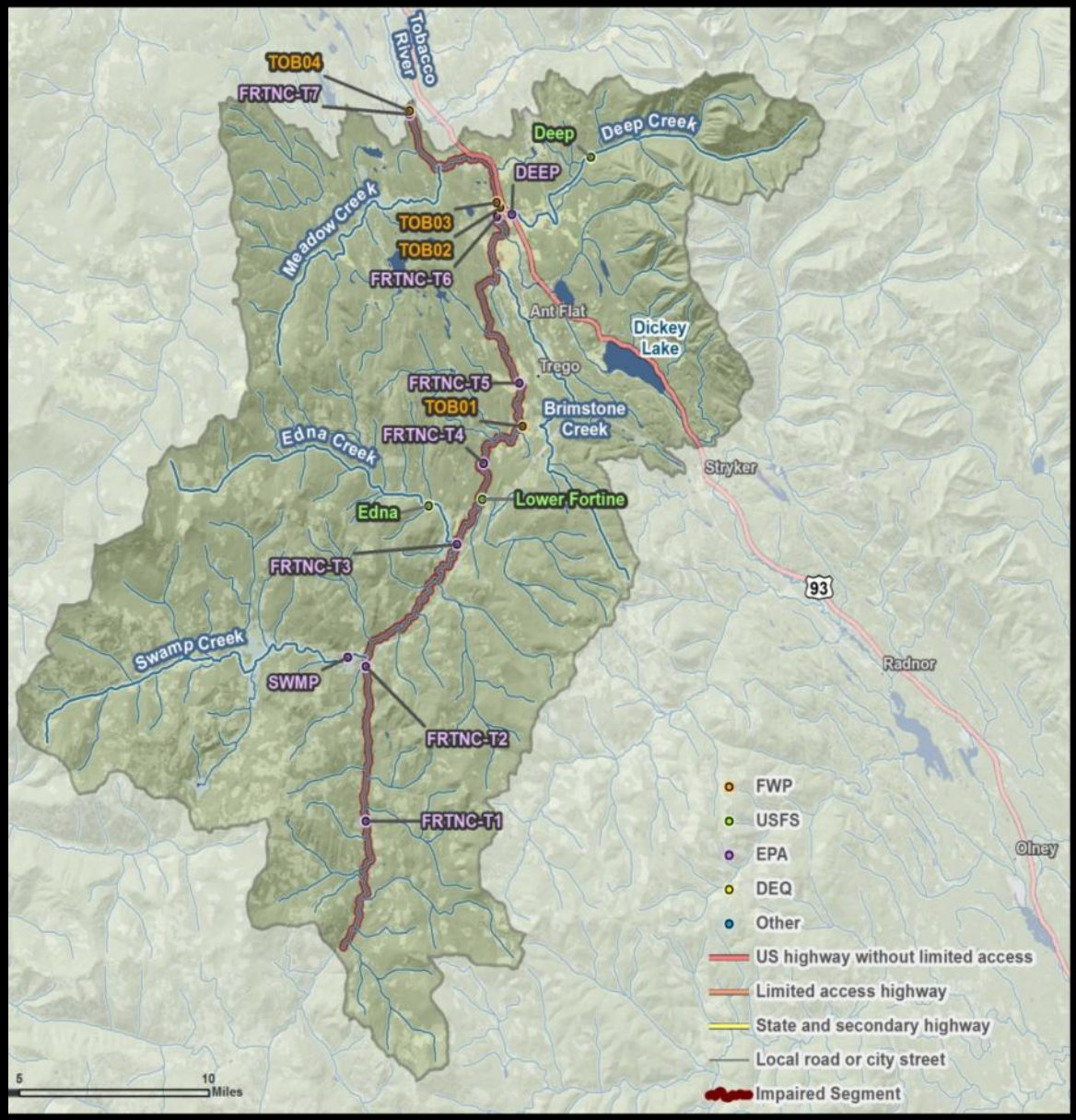


Example TMDL: Lime Creek TN

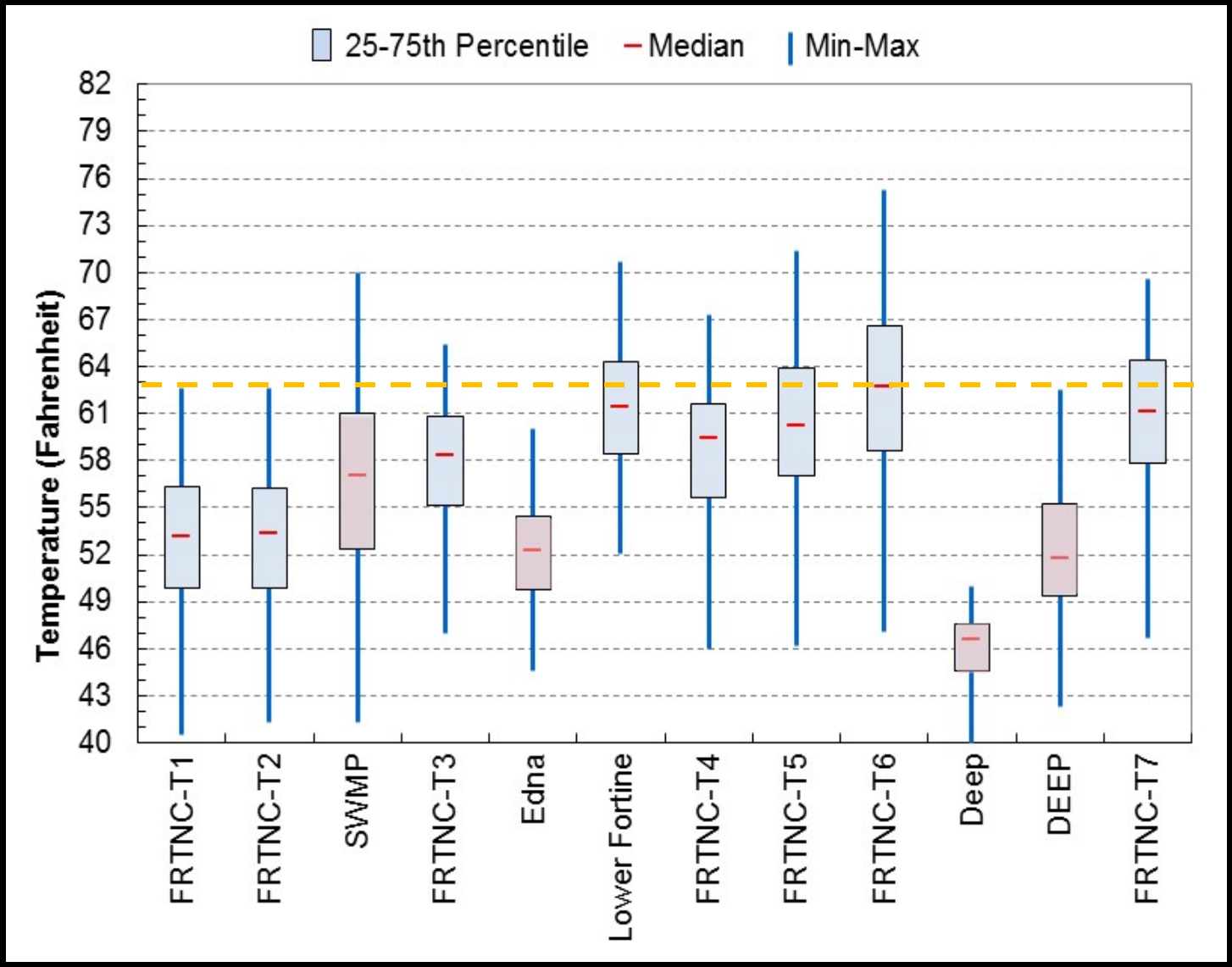
Allocation	Source Category	Current Load (lbs/day)	% Reduction	Allocation (lbs/day)
Load Allocation	Natural Background	1.01	0%	1.01
	All other nonpoint sources	22.58	73%	6.12
TMDL	**All Sources**	23.59	70%	7.13

Fortine Creek Temperature

- 2012: 7 loggers on Fortine Creek and 2 tributary sites
- 2012: 3 loggers deployed by USFS
- 2012: Flow collected at all sites and shade measurements on Fortine Creek
- 2003-2005 USFS and FWP deployed loggers

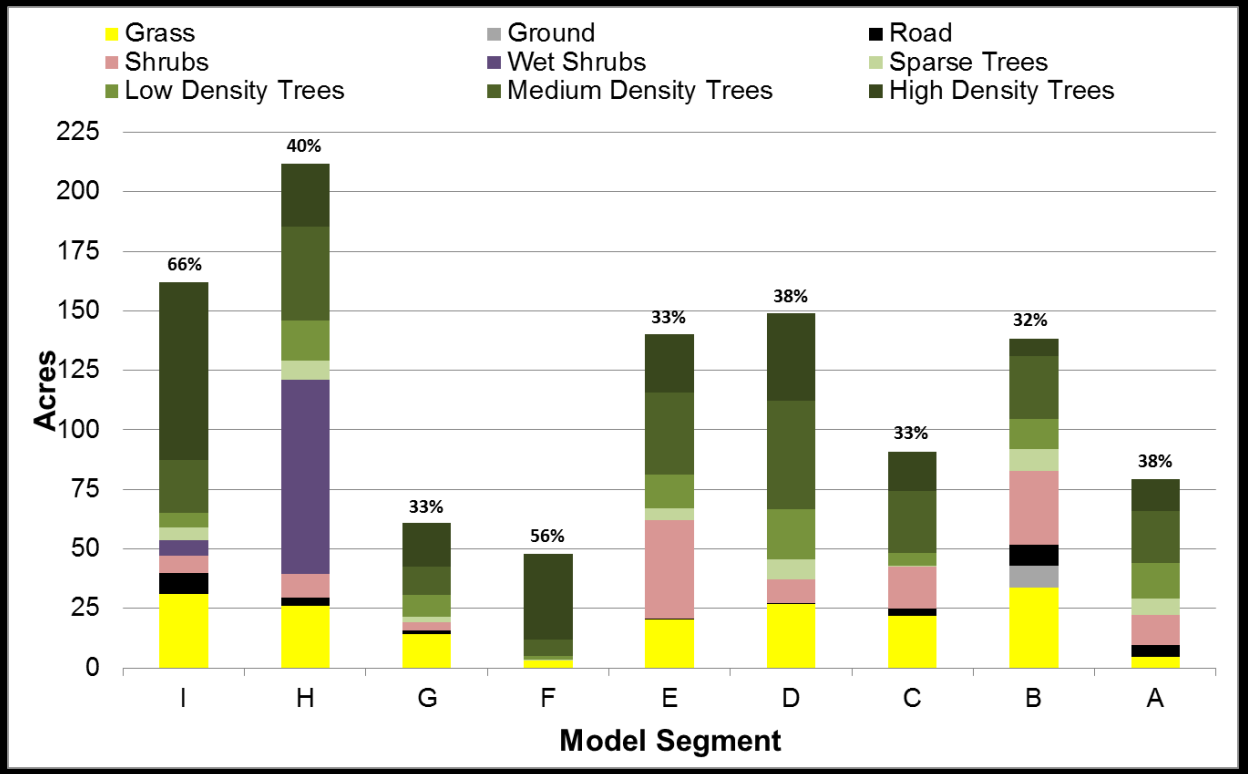


2012 Data


25-75th Percentile
Median
Min-Max
Temperature (Fahrenheit)
82
79
76
73
70
67
64
61
58
55
52
49
46
43
40
FRTNC-T1
FRTNC-T2
SWMP
FRTNC-T3
Edna
Lower Fortine
FRTNC-T4
FRTNC-T5
FRTNC-T6
Deep
DEEP
FRTNC-T7

Vegetation Mapping

- Aerial photo classification within a 150 buffer of the stream into: trees, shrubs, herbaceous
- Tree density categorized based on canopy from 2001 NLCD
- Vegetation info used in combination with GIS data to estimate effective shade

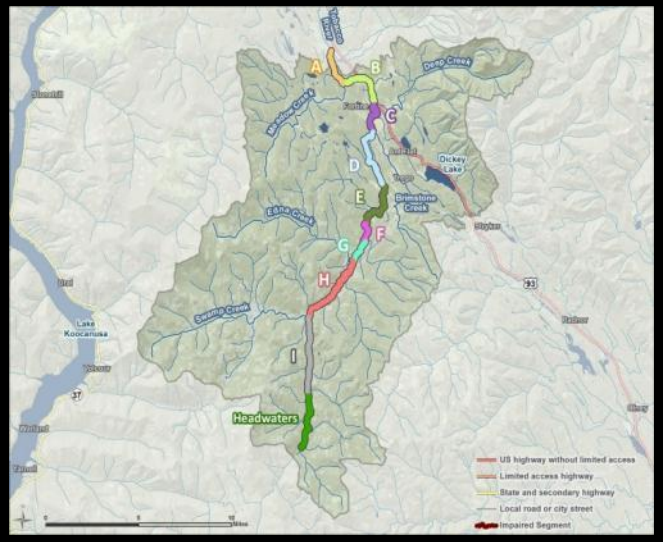


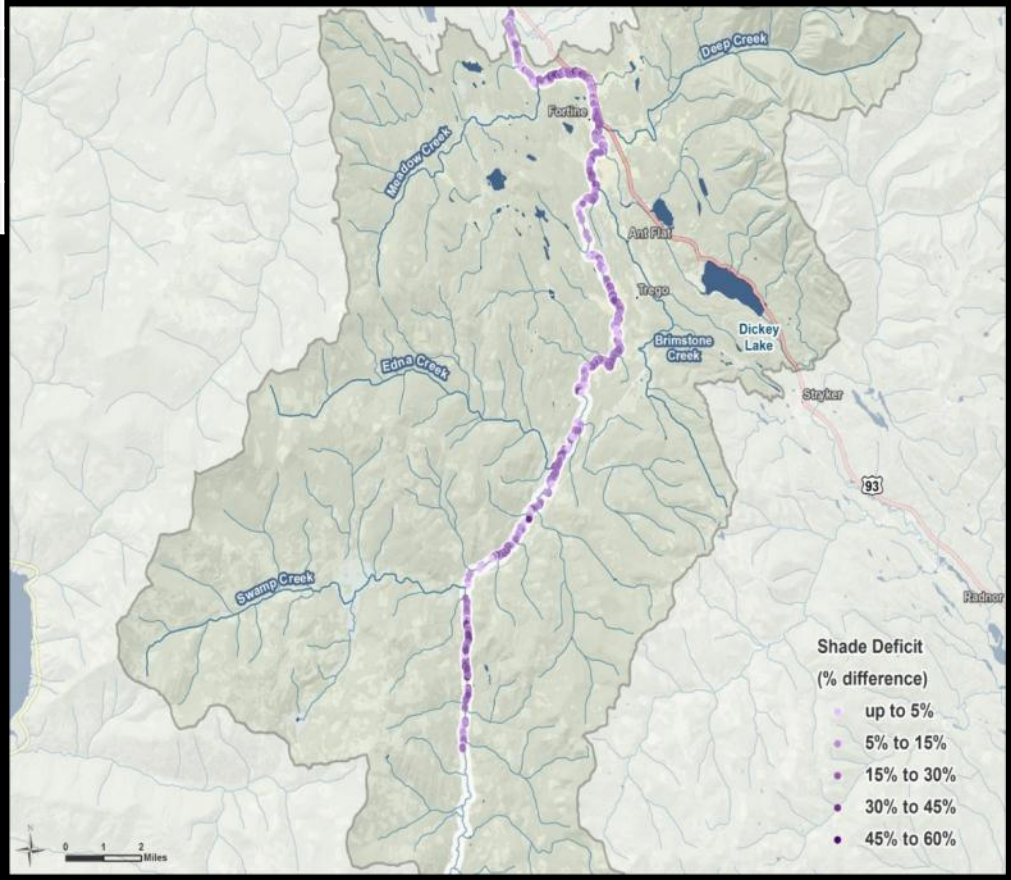
Temperature Standard & Model Framework

- The standard allows a human caused 0.5 or 1°F change from the naturally occurring temperature, and meeting this is the primary target
- Targets for shade, width/depth ratio, and water use
- QUAL2K used to model the existing temperature and 7 scenarios
  - Comparison between scenarios shows level of impairment and improvement needed

Scenario	Summary
1 - Existing Condition (baseline)	Based on current streamflow, climate, and shade conditions.
2 – No Withdrawals (sensitivity analysis)	Existing condition without water withdrawals.
3 - Maximum Shade (sensitivity analysis)	Existing condition with all vegetation communities within the 150 foot buffer along each side of the stream transformed to “high density trees” with the exception of roads, railroads, and areas dominated by hydrophytic shrubs.
4 – Improved Shade	Existing condition with all vegetation communities, with the exception of hydrophytic shrubs, roads, and railroads transformed to medium density trees within 50 feet of the stream banks. To simulate achievement of all reasonable land and soil conservation practices.
5 – Improved Water Management	Existing condition with withdrawals reduced by 15%. To simulate achievement of all reasonable water conservation practices.
6 – Naturally Occurring	Existing condition scenario with improved riparian vegetation in a 50-foot buffer and a 15 percent reduction of water withdrawals. This is to simulate full standards attainment via the use of all reasonable land, soil, and water conservation practices.
7 – Low Flow Existing Condition	Low flow existing condition scenario. To simulate stream temperatures on a drier year than the existing condition (Scenario 1).
8 – Low Flow Naturally Occurring	Existing condition scenario with improved riparian vegetation in a 50-foot buffer and a 15 percent reduction of water withdrawals. To simulate full standards attainment via the use of all reasonable land, soil, and water conservation practices relative to the low flow existing condition (Scenario 7).

Comparison of effective shade between the existing condition and improved shade scenario		
Model Segment	Current Conditions	Improved Shade Scenario
I	82%	86%
H	55%	62%
G	47%	61%
F	73%	74%
E	48%	60%
D	52%	61%
C	49%	63%
B	42%	60%
A (mouth)	53%	63%
Average	56%	66%



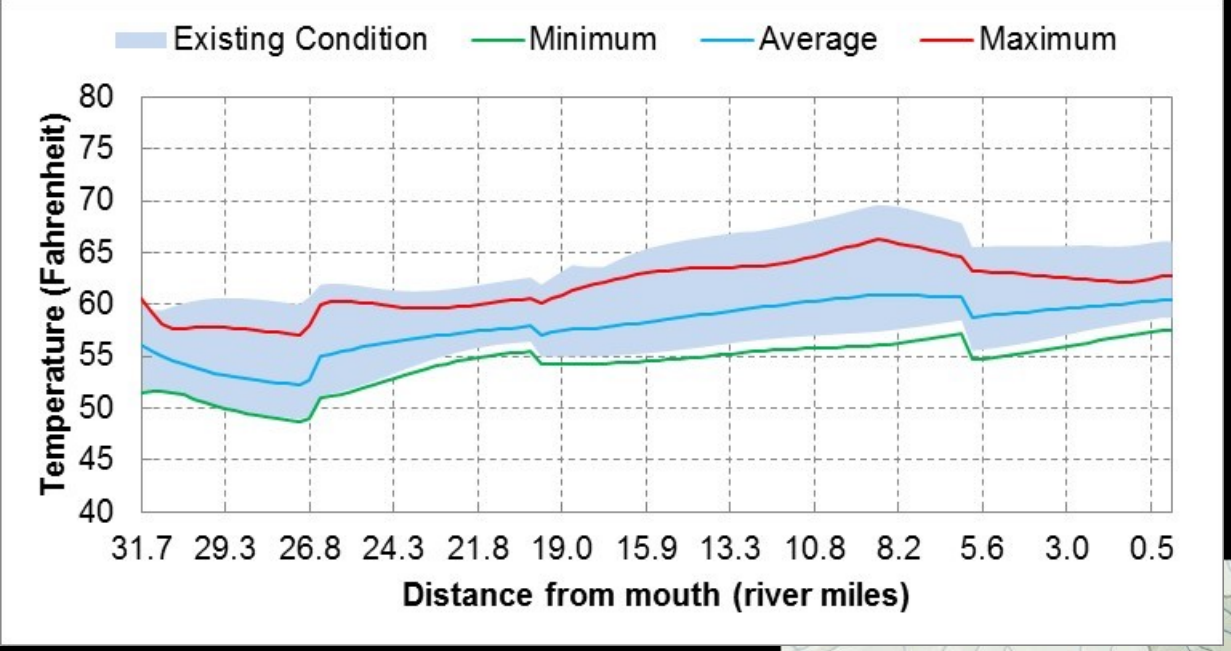


Scenario Results

Scenario	FRTNC-*						
	*T1	*T2	*T3	*T4	*T5	*T6	*T7
Shade	-1.4	-2.7	-2.0	-1.7	-3.4	-3.4	-3.4
Water Use	0	0	-0.001	-0.01	-0.02	-0.02	-0.04
Naturally Occurring	-1.4	-2.8	-2.0	-1.7	-3.4	-3.4	-3.4
Low flow Naturally Occurring	-2.5	-3.8	-2.9	-2.6	-5.1	-5.0	-4.6

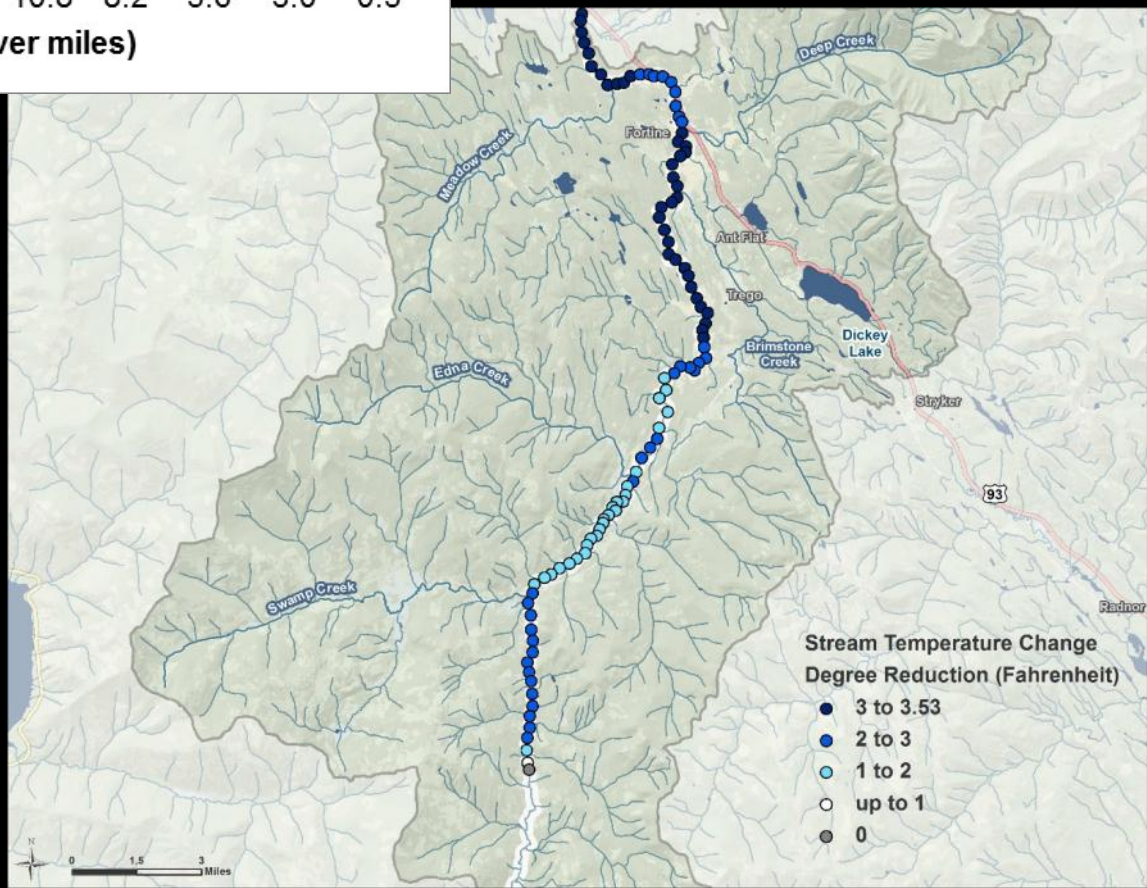
-Fortine Creek is much more sensitive to changes in shade than water use

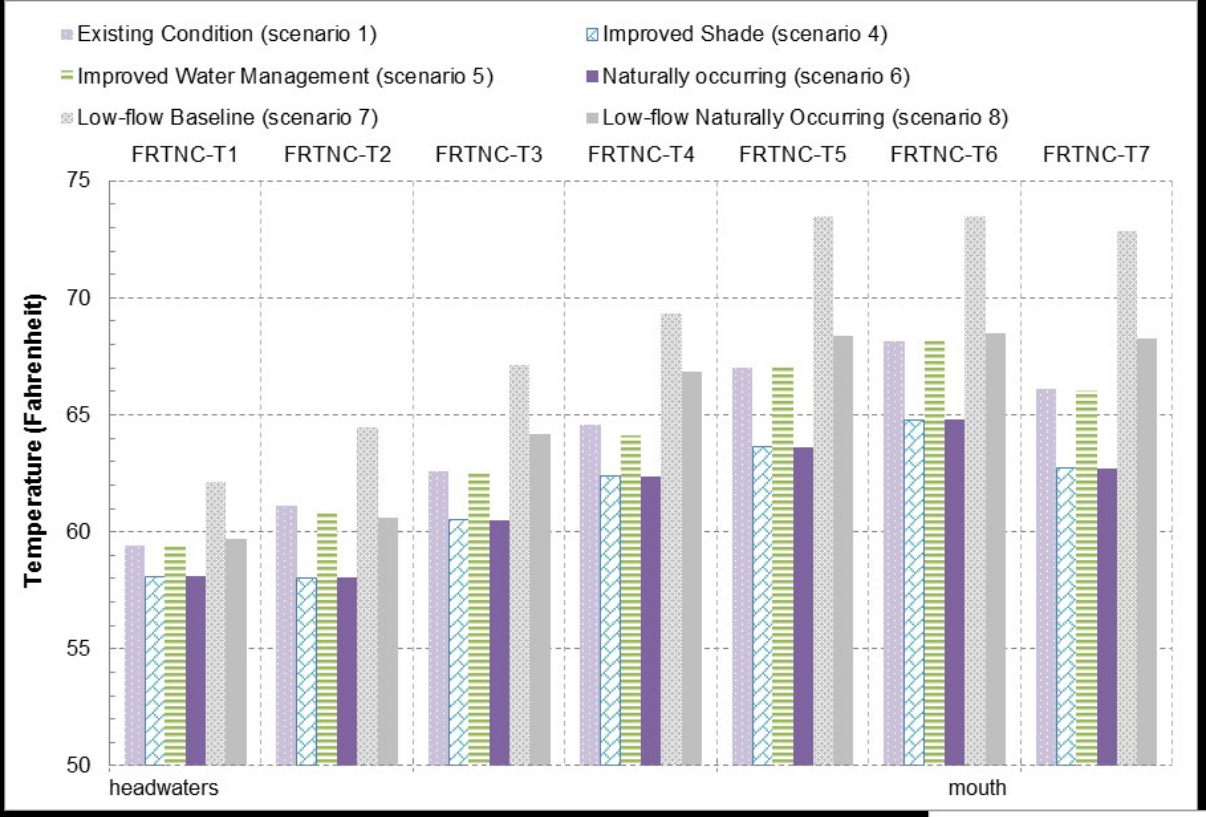
-Under low flow conditions, effects of shade improvements are magnified



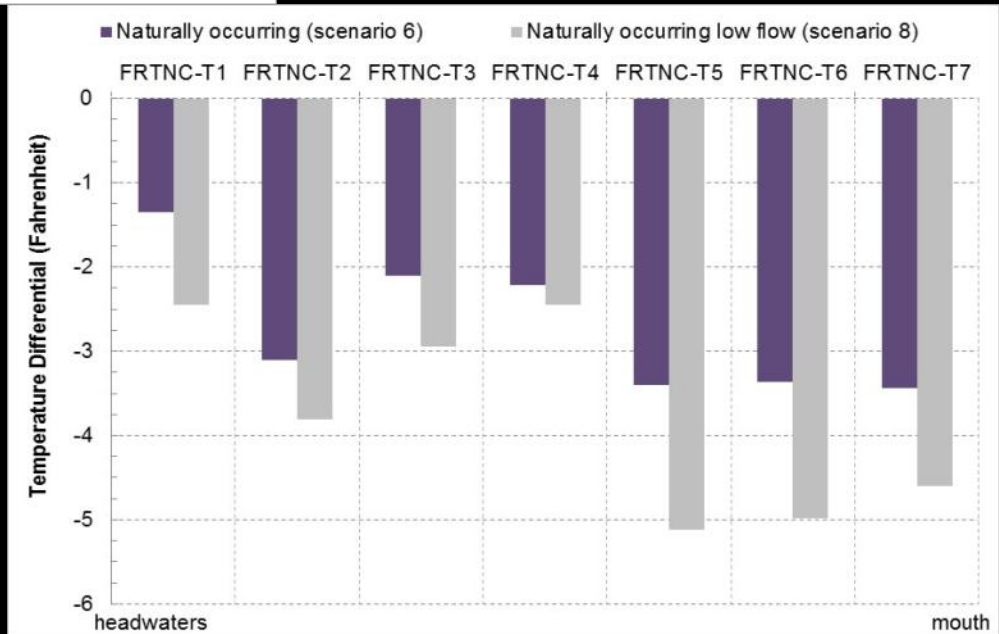
Naturally Occurring Scenario

- Naturally occurring temperatures range from 57.1°F to 66.3°F
- Allowable human-caused increase of 1.0°F
- Human sources causing an increase of 1.4 – 3.5°F (average = 2.6°F)





Summary of Results



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	31,792	29,555	7%

Source Type	Surrogate Allocation
Land uses and practices that reduce riparian health and shade provided by near-stream vegetation along Fortine 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 overwidening 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 • Where bankfull width < 30ft, a width/depth ratio $\leq$ 21 • Where bankfull width > 30ft: a width/depth ratio $\leq$ 35
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 instream flow.**

Implementation Strategy

- Nutrient and Temperature Goals
  - Continued use of BMPs where they already exist
  - Improve and restore riparian areas where current BMPs are insufficient
  - Improve land use management practices to reduce pollutant loading while still providing viable and sustainable economic growth
- Adaptive Management

BMP = best management practice

Now That it's Done, What Does this Mean?

- A TMDL does not create or impose new regulations
- Implementation is voluntary for nonpoint sources

Next Steps

- If possible, integrate into the Watershed Restoration Plan being developed
  - Identify priorities
  - Refine source assessment
- Seek Funding to Implement Projects
  - Potential sources: 319, Future Fisheries Improvement Program, Watershed Planning and Assistance, EQIP

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406-457-5001

Public Comment Period

- July 16 – August 12
- Document available:
  Eureka Public Library and DEQ website
  http://deq.mt.gov/pubcom.mcpx
- Submit comments in writing here, via mail, or electronically on DEQ website