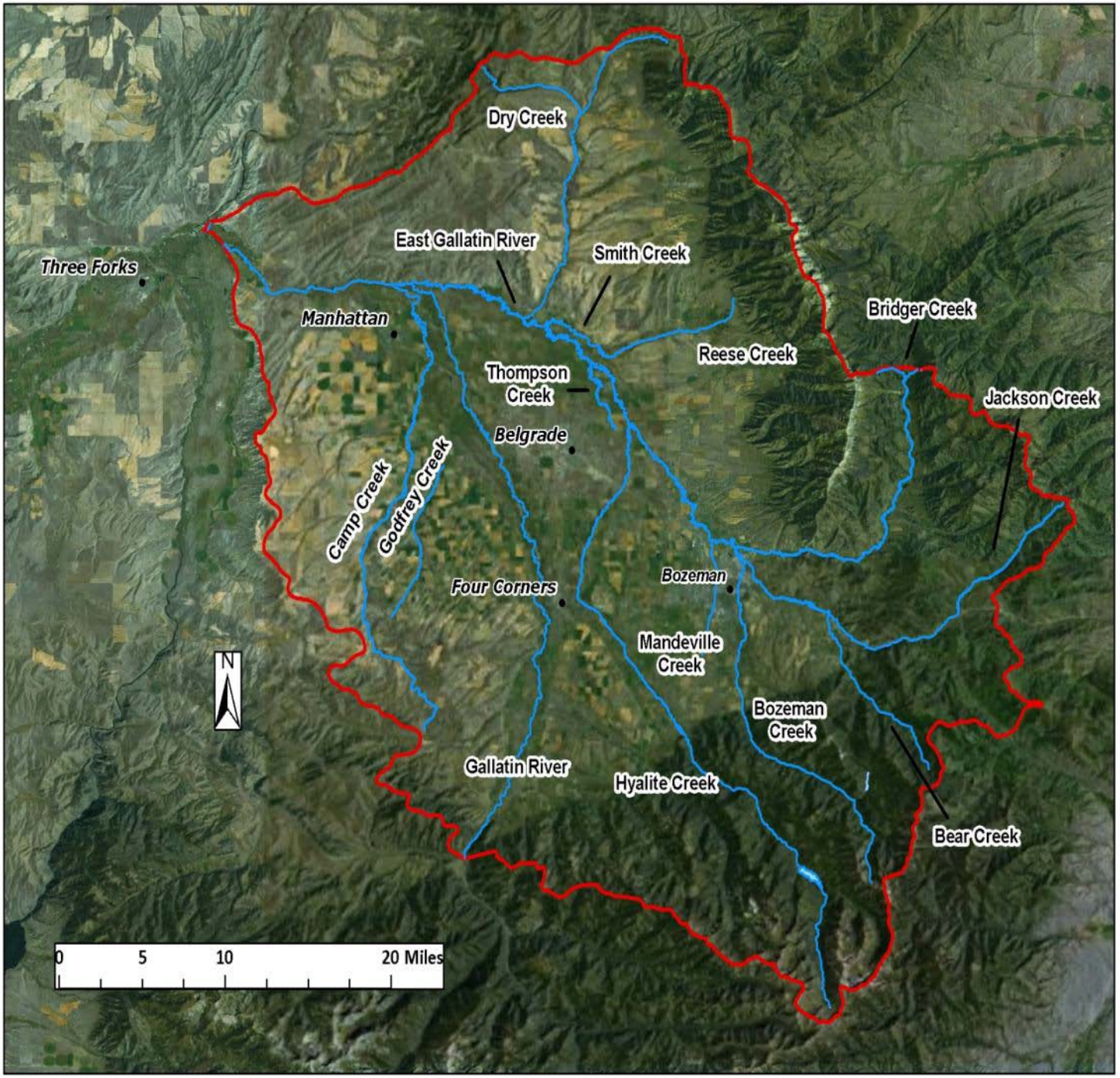
Lower Gallatin Sediment, Nutrient, and Pathogen TMDLs

Christian Schmidt, DEQ
Lisa Kusnierz, EPA

September 27, 2012


Dry Creek
East Gallatin River
Smith Creek
Three Forks
Manhattan
Bridger Creek
Reese Creek
Thompson Creek
Jackson Creek
Belgrade
Camp Creek
Godfrey Creek
Four Corners
Bozeman
Mandeville Creek
N
Bozeman Creek
Gallatin River
Hyalite Creek
Bear Creek
0 5 10 20 Miles

Public Comment Period

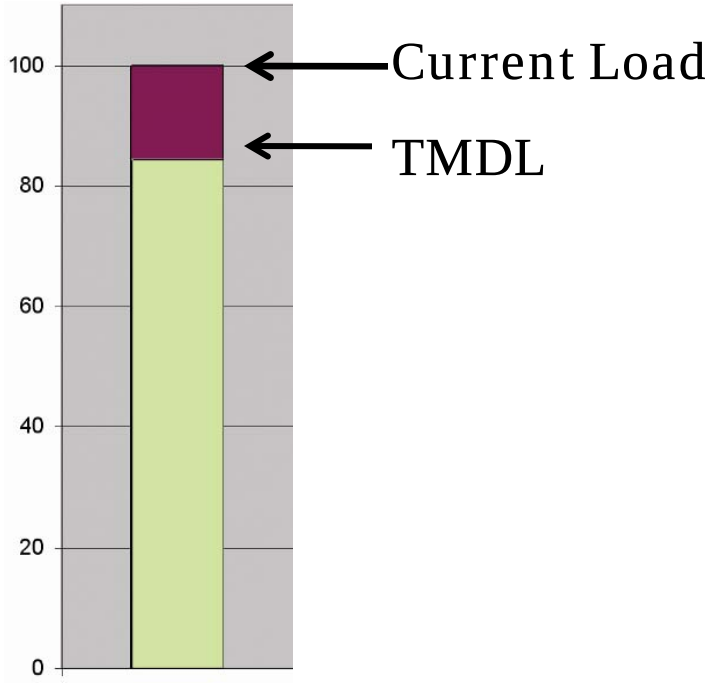
- Start: September 7th, 2012
- End: October 6th, 2012

- Final document is available at…
  - http://deq.mt.gov/pubcom.mcpx
  - State library in Helena
  - Belgrade, Bozeman and Manhattan public libraries

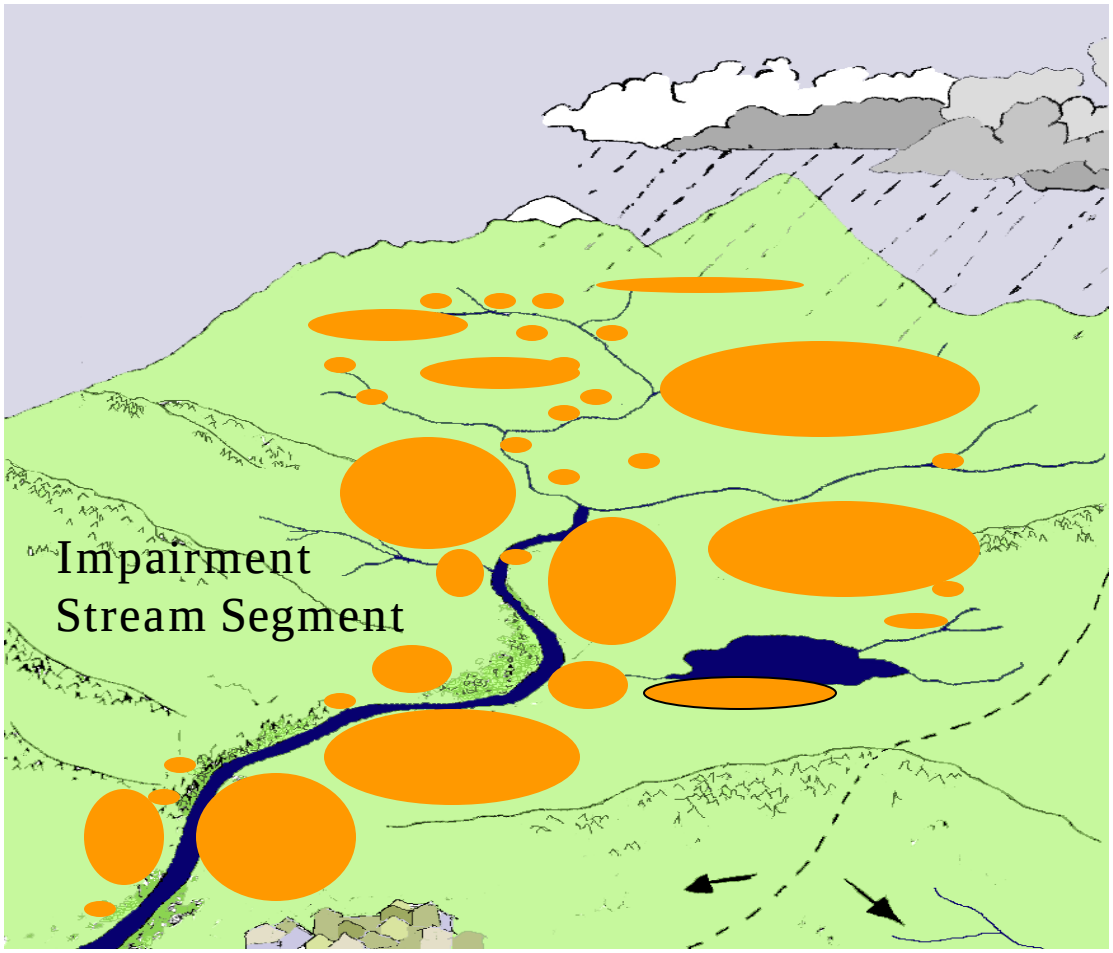
- Submit comments by end of period to;
  - http://comment.cwaic.mt.gov
  - ATTN: Christian Schmidt
    MDEQ
    PO BOX 200901
    Helena MT 59620-0901

What is a TMDL?

- Total Maximum Daily Load is the amount (loading rate) of a pollutant that a water body 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)



A Watershed Approach



The document is a framework for water quality improvement

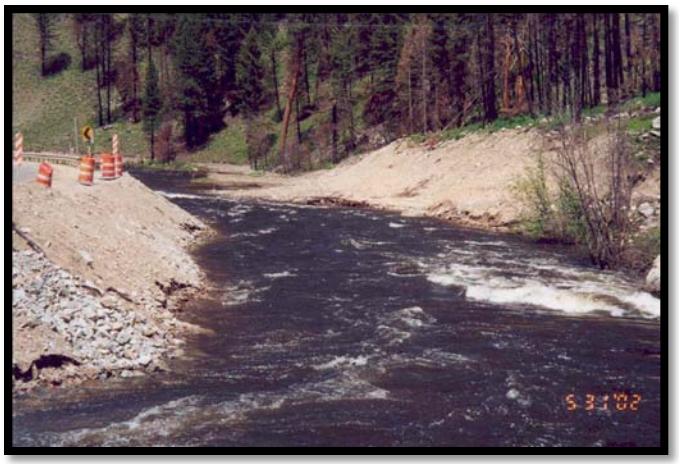
- Pollutant Source Area (Human Related)

Why are TMDLs Developed?

- Montana state law & the federal Clean Water Act (CWA) require Montana to assess the quality of its waters and whether they are supporting their designated beneficial uses
  - Agriculture, drinking water, recreation, aquatic life
- TMDLs must be developed for waterbodies with pollutant causes of impairment
  - One stream segment may have multiple TMDLs for different pollutants

Major Pollutant Impairment Cause Groups in the Lower Gallatin

- **Sediment** (sediment)
- **Nutrients** (total phosphorus, total nitrogen)
- **Pathogens** (e-coli)
- Other groups include metals, temperature and salinity – no listings in Lower Gallatin



Document Layout

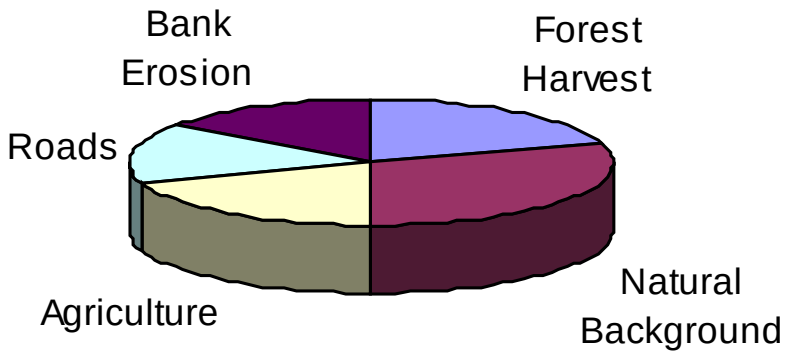
- Watershed Description
- Water Quality Standards Overview
- TMDL Process Overview
- Separate Sections for Sediment, Nutrients, and E. coli
- Implementation Strategy
- Monitoring Strategy

TMDL Development Steps

- Identify Water Quality Targets
- Define Magnitude and Extent of Pollutant Impacts
- Source Assessment
- Establish the TMDL & Associated Allocations

What makes up a TMDL or the Allowable Load?

- TMDL = Load Allocation (LA) + Waste Load Allocation (WLA) + Margin of Safety
- Allocations Usually Based on Existing Loading and Opportunity for Reductions Via BMPs

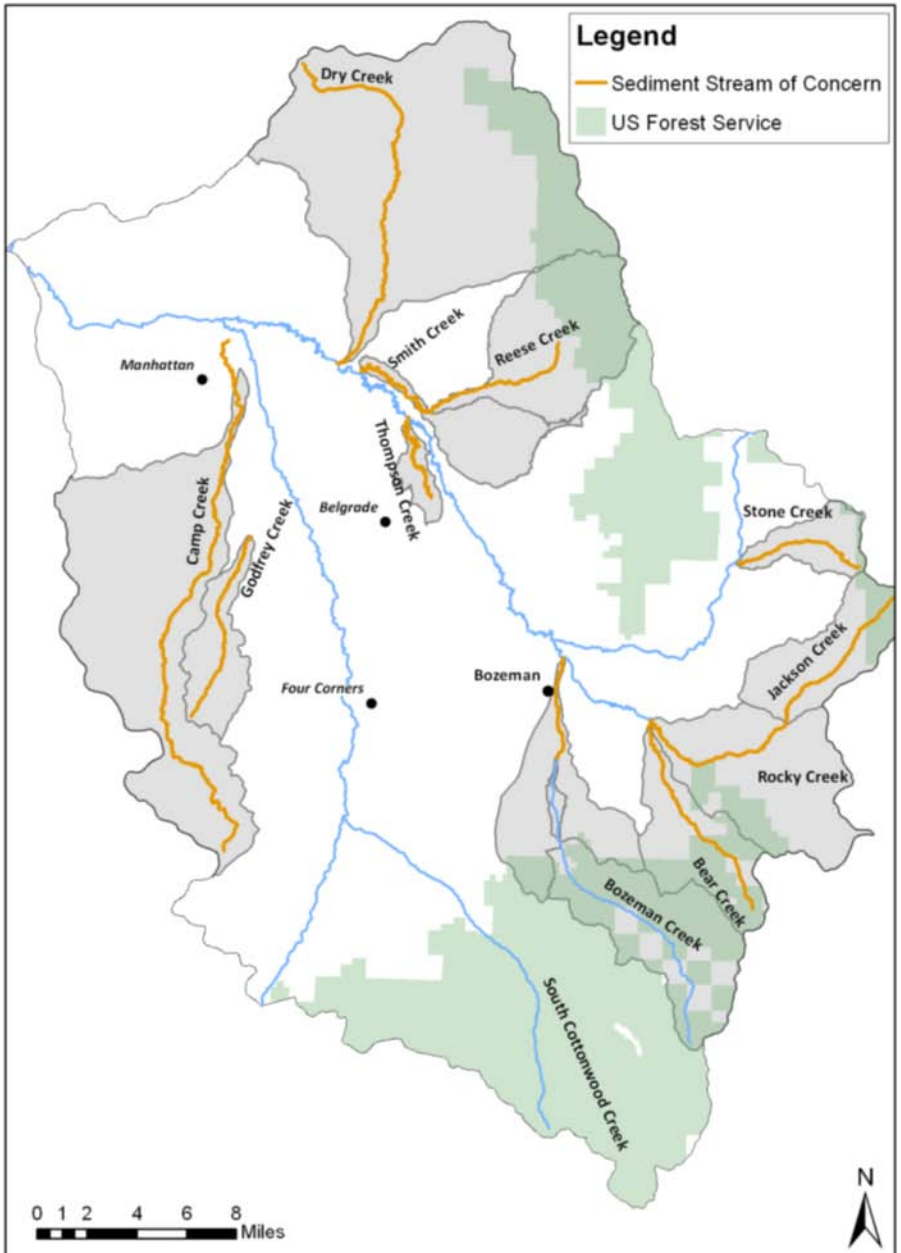


How is a TMDL implemented?

- It is **non-regulatory** for non-point sources of pollutants…implementation of BMPs or other control measures on a VOLUNTARY basis to restore beneficial uses
  - Existing regulations related to 310 permits and streamside management zones still apply
- For permitted point sources, the waste load allocation (WLA) is regulatory and is enforced by the MPDES permitting process

11 Sediment TMDLs

- Bear Creek
- Bozeman Creek (Sourdough)
- Camp Creek
- Dry Creek
- Godfrey Creek
- Jackson Creek
- Reese Creek
- Rocky Creek
- Smith Creek
- Stone Creek
- Thompson Creek

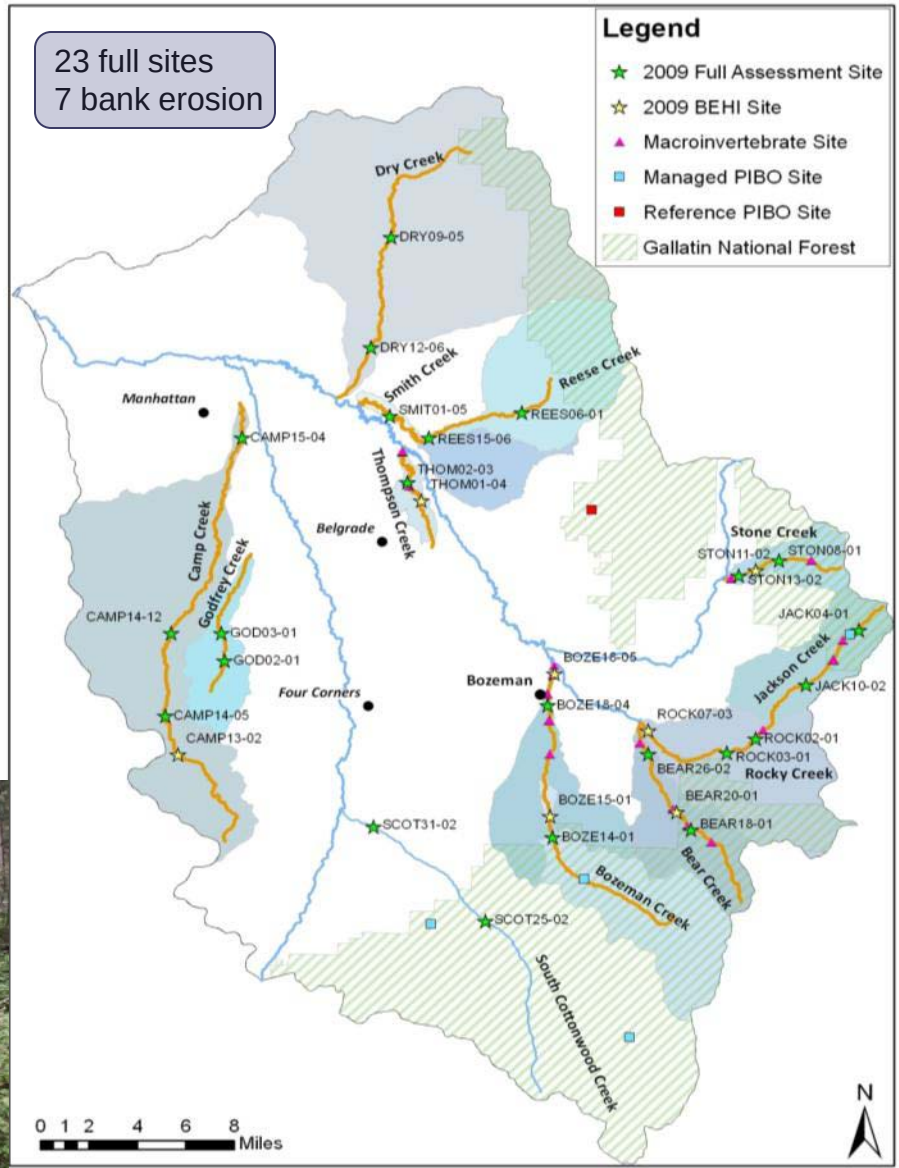


Sediment – Water Quality Targets

- State water quality standards for sediment are ‘narrative’
  - No increases are allowed above naturally occurring concentrations….which are likely to create a nuisance or render the waters harmful…
- To help translate the narrative standard, a suite of sediment related parameters are used
- Targets help define the level of harm and serve as restoration goals
- Target values based on reference, literature, and DEQ data

Sediment - Target Parameters

- Channel form
- Percent fine sediment
- Residual pool depth
- Frequency of pools and large woody debris
- Macroinvertebrate index



Data Sources

Courtesy of USFS

- Assessment data and notes from DEQ assessment files
- 2009 Sediment/Habitat Assessments
- USFS reference and non-reference data, and grazing allotment planning documents
- 2003 and 2011 Bear Creek data (USFS)
- 2002 Bozeman Creek watershed assessment (Bozeman Watershed Council)
- GGWC data (pebble count and macroinvertebrates)
- 2009 nutrient and E. coli source assessment

Source Assessments

- Streambank Erosion
- Unpaved Roads
- Upland Erosion
- Point Sources
  - Construction and Industrial Stormwater
  - Bozeman Stormwater (MS4)

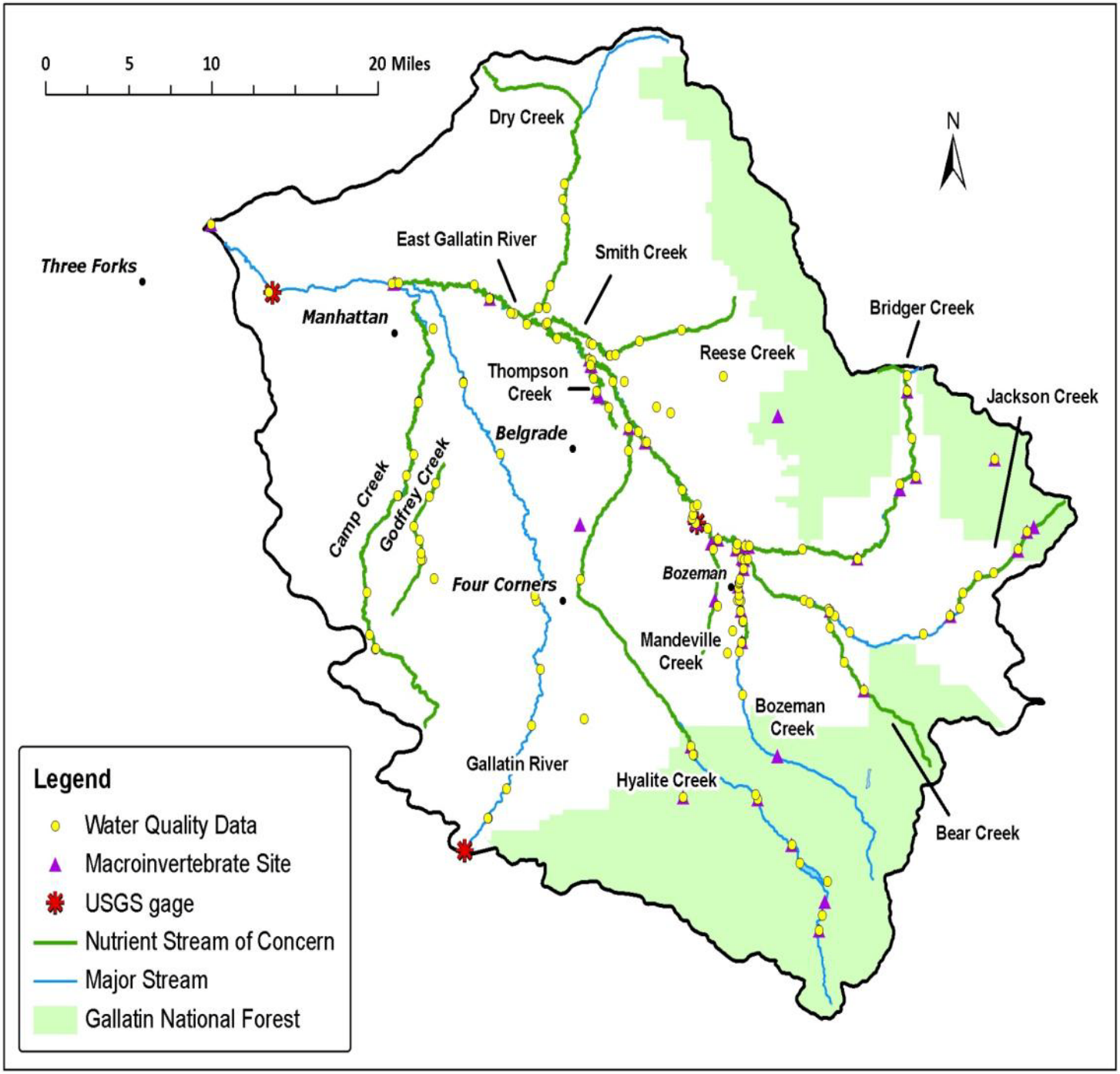
Meeting Allocations

- Streambank Erosion: improving the health of the riparian vegetation
- Roads: reducing the contributing length
- Upland Erosion: improving the upland and riparian vegetative cover
- Point Sources: following permit conditions

- Implementation section & MT's Nonpoint Source Management Plan has BMP practices

TMDL Example – Camp Creek

Sediment Sources	Current Estimated Load (Tons/Year)	Total Allowable Load (Tons/Year)	Load Allocations (% reduction)
Roads	23	19	17%
Streambank Erosion	3,119	1,281	59%
Upland Sediment Sources	5,309	1,832	65%
Total Sediment Load	**8,451**	**3,132**	**63%**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20 Miles
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Dry Creek
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Belgrade
Camp Creek
Godfrey Creek
Four Corners
Bozeman
Mandeville Creek
Bozeman Creek
Gallatin River
Hyalite Creek
Bear Creek
Legend
Water Quality Data
Macroinvertebrate Site
USGS gage
Nutrient Stream of Concern
Major Stream
Gallatin National Forest

Nutrient – Water Quality Targets

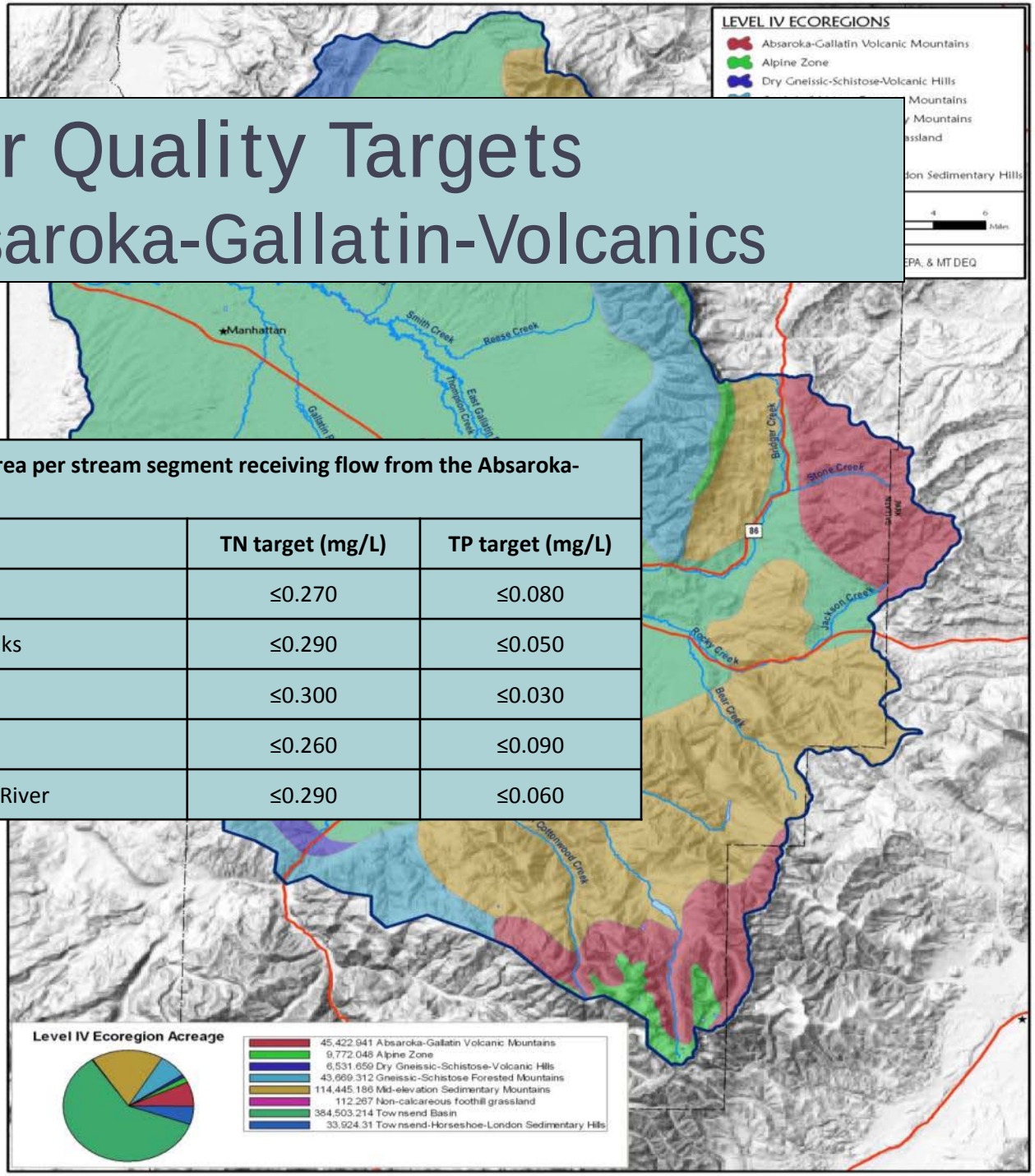
Growing Season: July 1 – Sept 30

Nutrient targets in the Lower Gallatin project area by ecoregion		
Parameter	Target values	
	Middle Rockies (Level III)	Absaroka-Gallatin Volcanics Ecoregion (Level IV, within Middle Rockies)
Nitrate+Nitrite (NO_3+NO_2)	≤ 0.100 mg/L	≤ 0.100 mg/L
Total Nitrogen (TN)	≤ 0.300 mg/L	≤ 0.250 mg/L
Total Phosphorous (TP)	≤ 0.030 mg/L	≤ 0.105 mg/L
Chlorophyll-a	≤ 120 mg/m^2 (≤35 g AFDW/m^2)	≤ 120 mg/m^2 (≤35 g AFDW/m^2)
AFDW = ash-free dry weight		

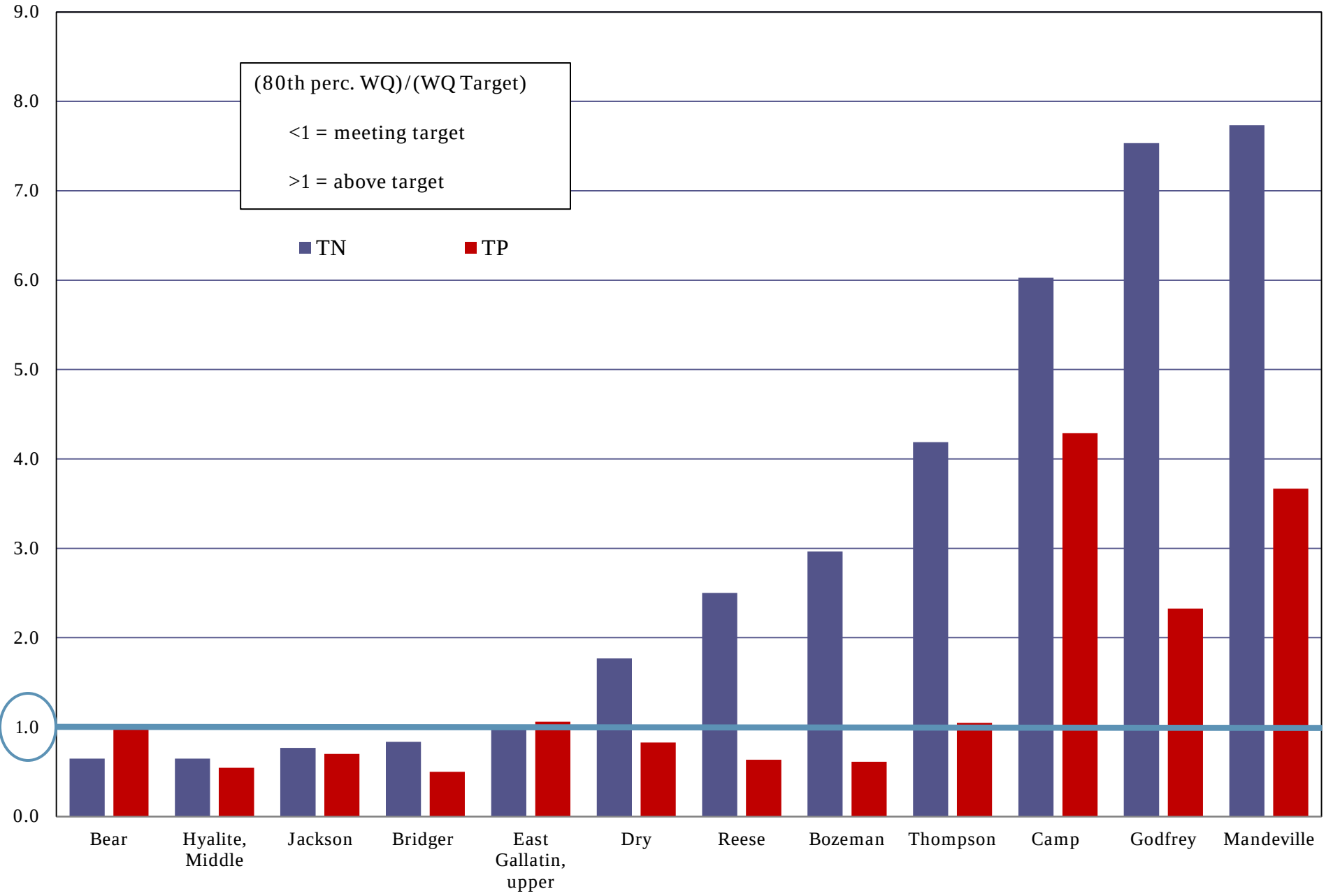
- Evaluated available data relative to targets using DEQ draft assessment method
- Allowable 20% exceedance rate
- TMDL decision based on outcome of data review

Nutrient Water Quality Targets
Influence of Absaroka-Gallatin-Volcanics

Nutrient Targets in the Lower Gallatin project area per stream segment receiving flow from the Absaroka-Gallatin-Volcanics Level IV ecoregion		
Stream segment	**TN target (mg/L)**	**TP target (mg/L)**
Bozeman Creek	≤0.270	≤0.080
East Gallatin between Bozeman and Bridger Creeks	≤0.290	≤0.050
East Gallatin between Bridger and Hyalite Creeks	≤0.300	≤0.030
Lower Hyalite Creek	≤0.260	≤0.090
East Gallatin between Hyalite Creek and Gallatin River	≤0.290	≤0.060



Water Quality Data and Numeric Targets



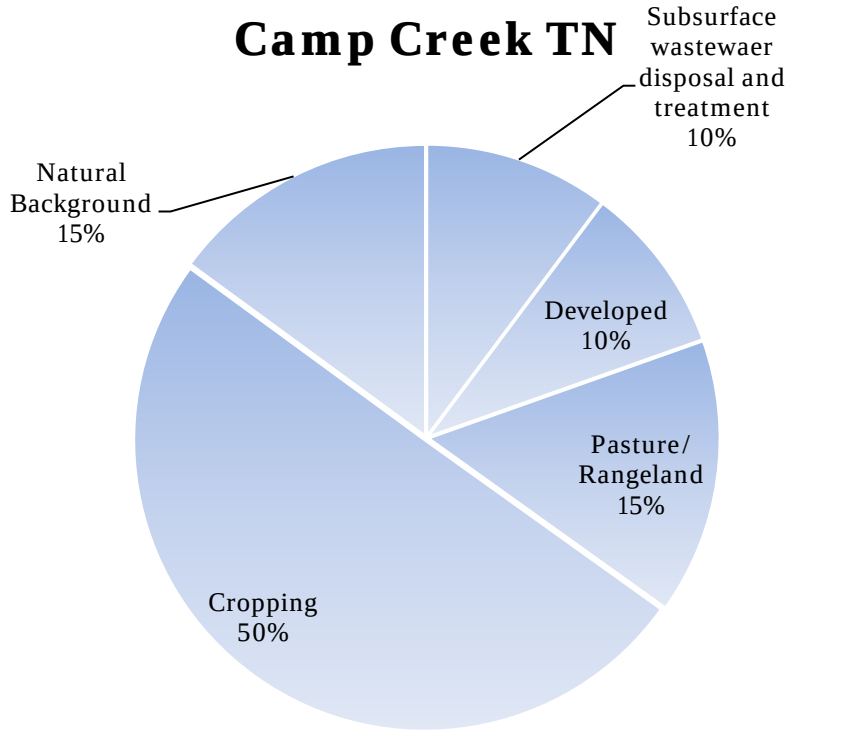
TMDLs – nutrients

- Source allocations
  - Based on synoptic sampling
  - Land-use characterizations
  - Septic modeling

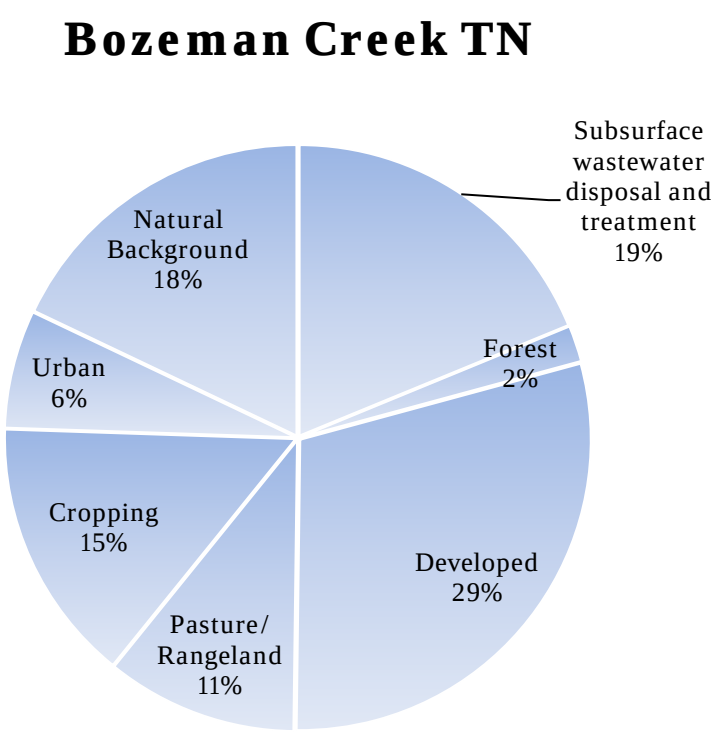
- TMDL example
- Camp Creek vs. Bozeman Creek
  - Agriculture vs. mixture of urban/developed/agriculture

TN TMDL examples

To achieve TN TMDL:
40% reduction in existing load



To achieve TN TMDL:
48% reduction in existing load



TN TMDL examples

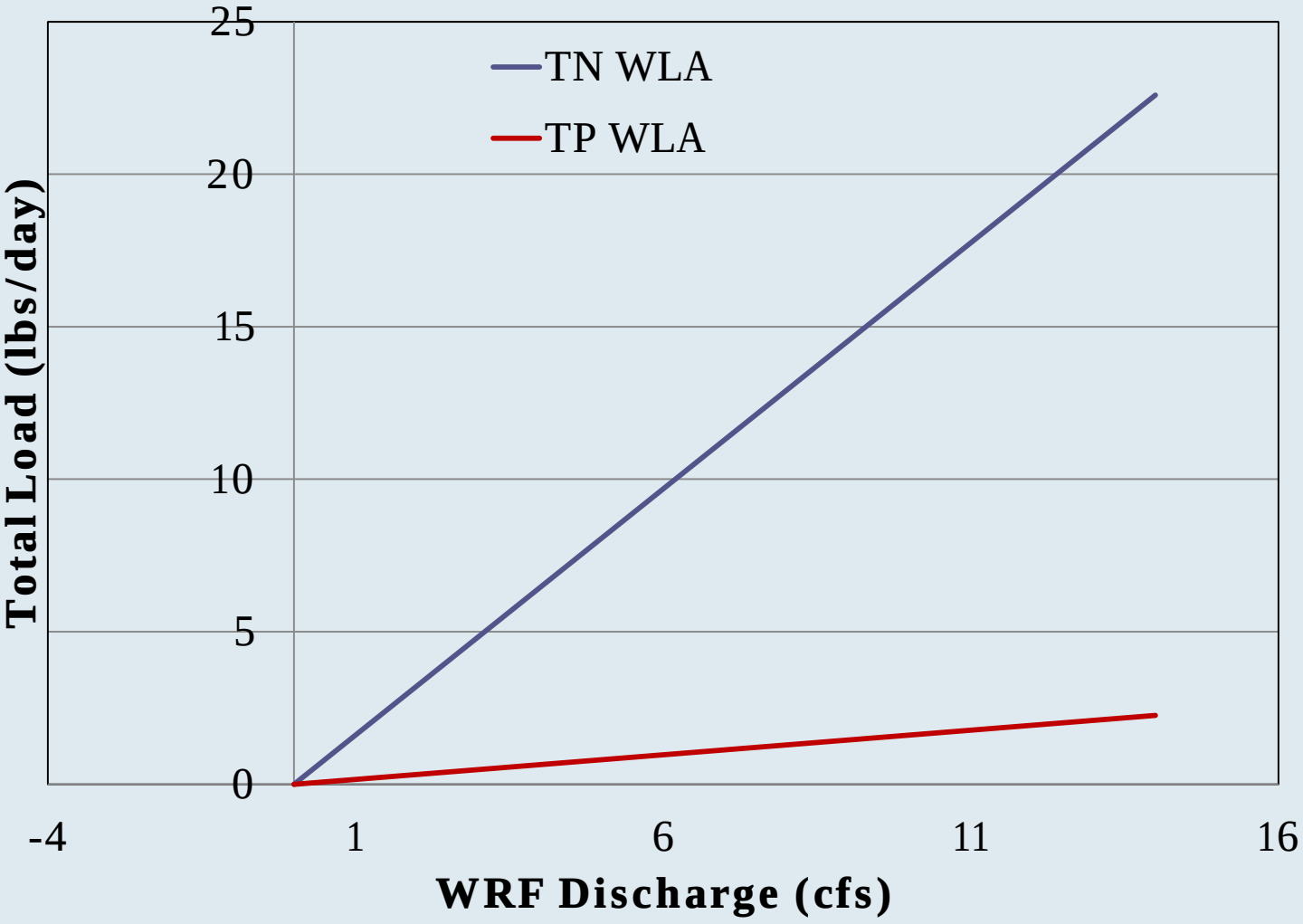
TN Allocations and TMDL for Camp Creek				
Source	**Existing Load (lbs/day)***	**LA (lbs/day)**	**TMDL (lbs/day)**	**% Reduction**
Natural Background	15.26	15.26		0.0%
Forest	0.00	0.00		0.0%
Agriculture	66.12	29.53		55.3%
Residential/Developed	10.17	4.54		55.3%
Subsurface Wastewater Treatment and Disposal	10.17	10.17		0.0%
Total	101.73		60.57	40.0%
* Based on a flow of 17.3 cfs				

TN Allocations and TMDL for Bozeman Creek.				
Source	**Existing Load (lbs/day)***	**LA (lbs/day)**	**TMDL (lbs/day)**	**% Reduction**
Natural Background	12.81	12.81		0.0%
Forest	2.29	2.29		0.0%
Agriculture	30.65	9.60		68.7%
Residential/Developed	45.64	14.29		68.7%
Subsurface Wastewater Treatment and Disposal	22.99	20.69		10.0%
Total	114.38		59.66	48.0%
* Based on a flow of 41.1 cfs				

TMDLs – nutrients

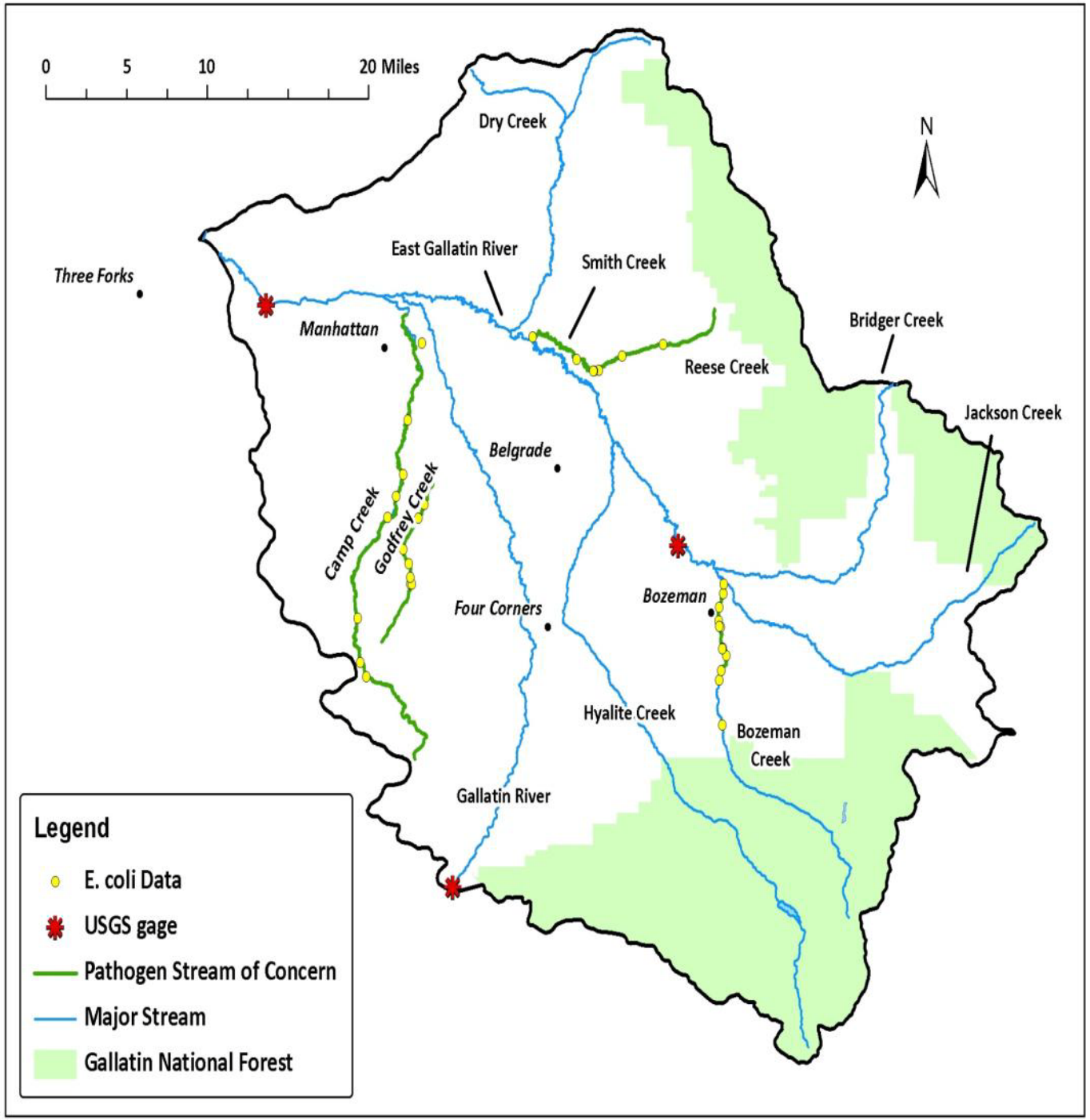
- Waste Load Allocations (WLAs)
  - Bozeman Fish Tech Center
  - MS4 (Stormwater)
    - SWMM model; DMR data
    - Performance based
    - Permit – **S**torm**W**ater **M**anagement **P**rogram (SWMP)

TMDLs – nutrients



City of Bozeman Water Reclamation Facility

- No new plant in 2017 - variance process/phased implementation
- Limits of technology to determine permit limits
- WLA based on ecoregion water quality target
  - If model/sampling determine a different water quality target and accepted by DEQ, the WLA would change to reflect the new target.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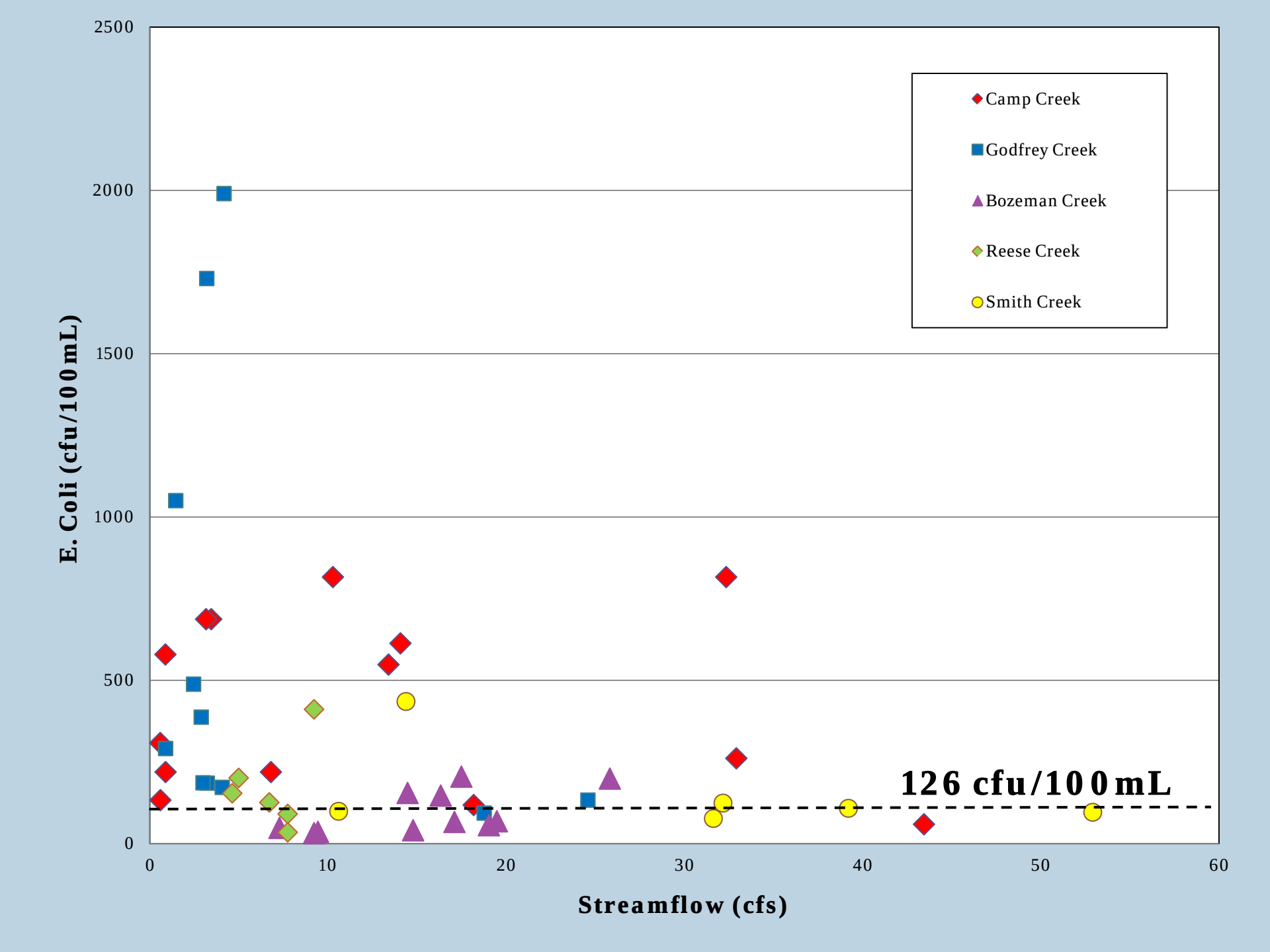
Montana Water Quality Criteria for E.coli for B-1 Waterbodies			
Applicable Period	**Standard**	**Geometric mean of 5 samples collected over a 30-day time period**	**No more than 10% of the samples shall exceed:**
Apr 1 – Oct 31 ("summer")	The geometric mean number of *E.coli* may not exceed 126 colony forming units per 100 milliliters and 10% of the total samples may not exceed 252 colony forming units per 100 milliliters during any 30-day period (ARM 17.30.623 (2)(i)).	<126 cfu/100mL	252 cfu/100mL
Nov 1 – Mar 31 ("winter")	The geometric mean number of *E.coli* may not exceed 630 colony forming units per 100 milliliters and 10% of the samples may not exceed 1,260 colony forming units per 100 milliliters during any 30-day period (ARM 17.30.623 (2)(ii)).	<630 cfu/100mL	1,260 cfu/100mL


2500
2000
1500
1000
500
0
E. Coli (cfu/100mL)
0
10
20
30
40
50
60
Streamflow (cfs)
Camp Creek
Godfrey Creek
Bozeman Creek
Reese Creek
Smith Creek
126 cfu/100mL

E. coli TMDL examples

***E. Coli* Allocations and TMDL for Camp Creek**			
Source	**Existing Load (cfu/day)**	**TMDL (cfu/day)**	**% Reduction**
Natural Background	27998.00	27998.00	0.0%
Agriculture/Residential	179107.42	45496.76	74.6%
Summary	207105.42	73494.76	64.5%

***E. Coli* Allocations and TMDL for Bozeman Creek**			
Source	**Existing Load (cfu/day)**	**TMDL (cfu/day)**	**% Reduction**
Natural Background	22050.28	22050.28	0.0%
Agriculture/Residential	45614.06	35831.70	21.4%
Summary	67664.34	57881.98	14.5%

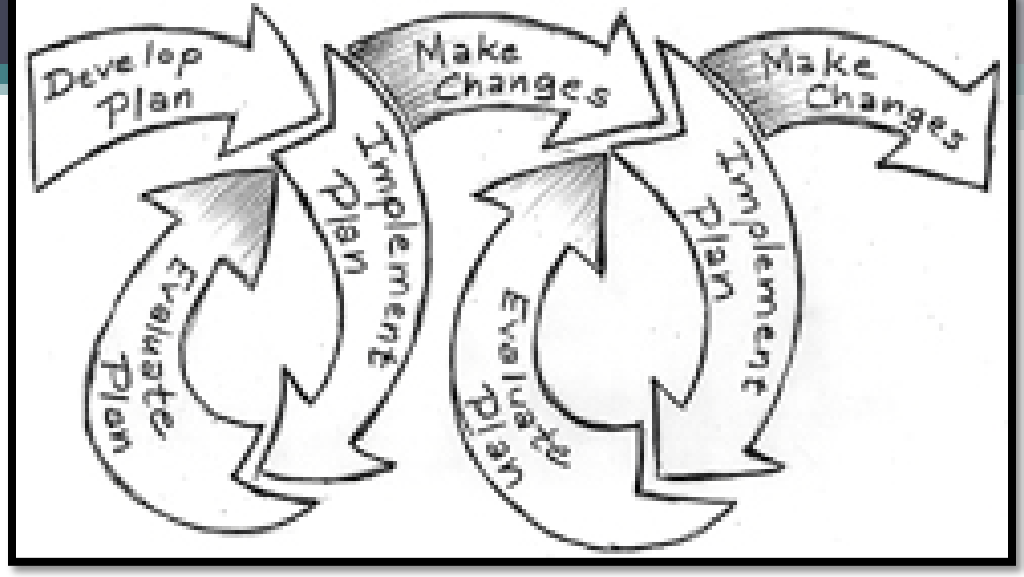
Water gaps limit cattle access to a stream and will allow the streambank to recover

Culvert replacement decreases potential sediment loading and improves access for fish and other aquatic organisms

Example BMPs

Altering grazing management can have a dramatic effect on riparian health and pollutant loading

Next steps



- Watershed Restoration Plan
  - Community developed and led plan to implement the TMDL
  - Future DEQ 319 funding may be dependent upon an approved plan
- TMDL Implementation Evaluation
  - Appropriate targets
  - Ann McCauley, DEQ

Current and potential funding

- Current contracts
  - GLWQD – septic characterization (through 2013)
  - GLWQD/GGWC - EPA urban waters small grant project
  - Gallatin Valley Land Trust/GGWC watershed and NPS outreach/education
  - MSU extension– E. coli monitoring
- Potential contracts (DEQ 319)
  - COB – Education and outreach for MS4
  - GWC – Watershed Restoration Plan
  - GGWC Water Quality Assistance Grant (Bridger and Hyalite)
- Funding sources
  - DEQ 319, Future Fisheries Improvement Program, Watershed Planning and Assistance, EQIP, RIT/RDG

Contact Information

- Lisa Kusnierz, EPA
  - Sediment TMDLs
  - Kusnierz.Lisa@epamail.epa.gov
  - Ph. 406-457-5001

- Christian Schmidt, DEQ
  - Nutrients and pathogens TMDLs
  - cschmidt2@mt.gov
  - Ph. 406-444-6777

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2nd Public Meeting

- Location: Manhattan Christian School
- Address 8000 Churchill Rd.
- Date: September 27th, 2012
- Time: 6:30 pm Q/A with talk at 7:30 pm