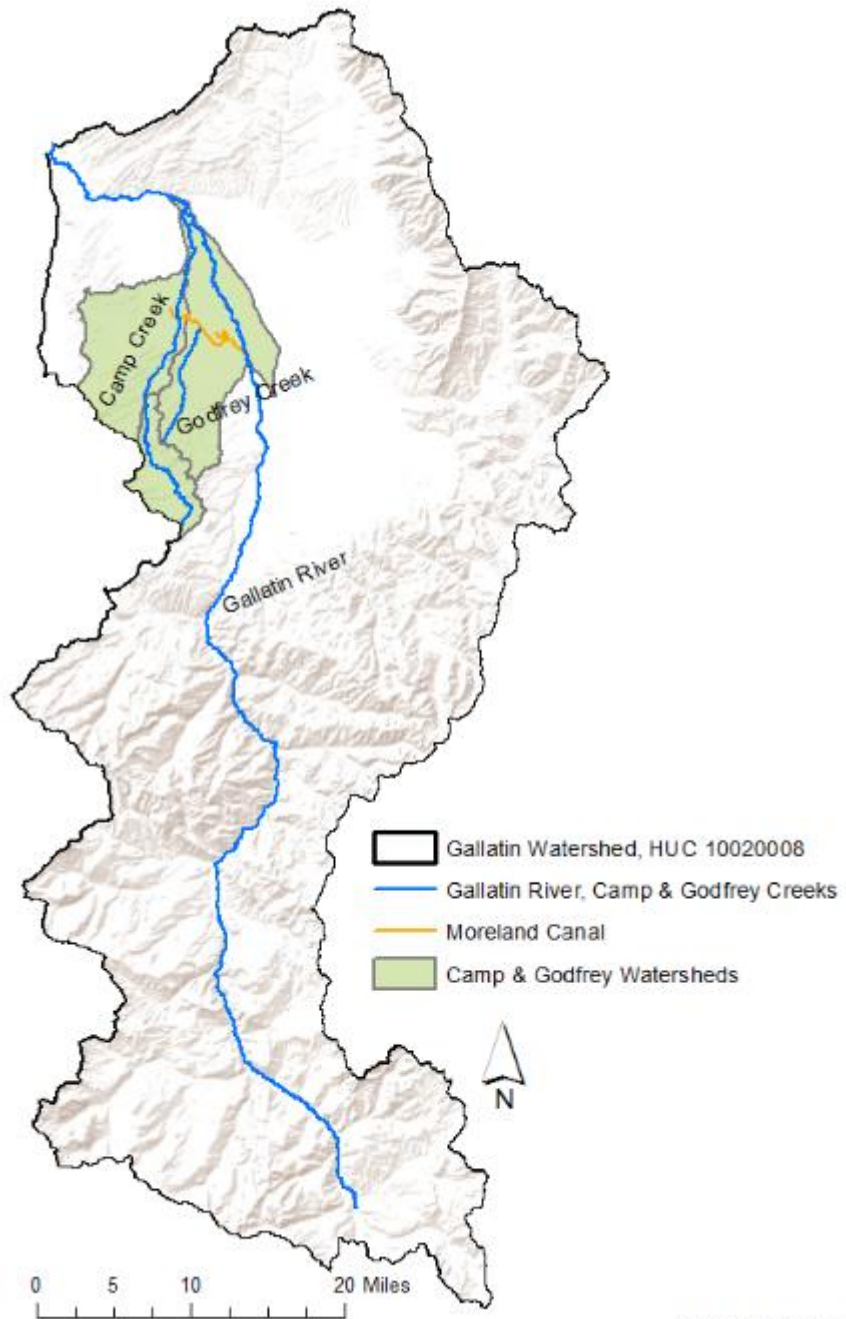






# National Water Quality Initiative Monitoring in Camp and Godfrey Creek, 2017

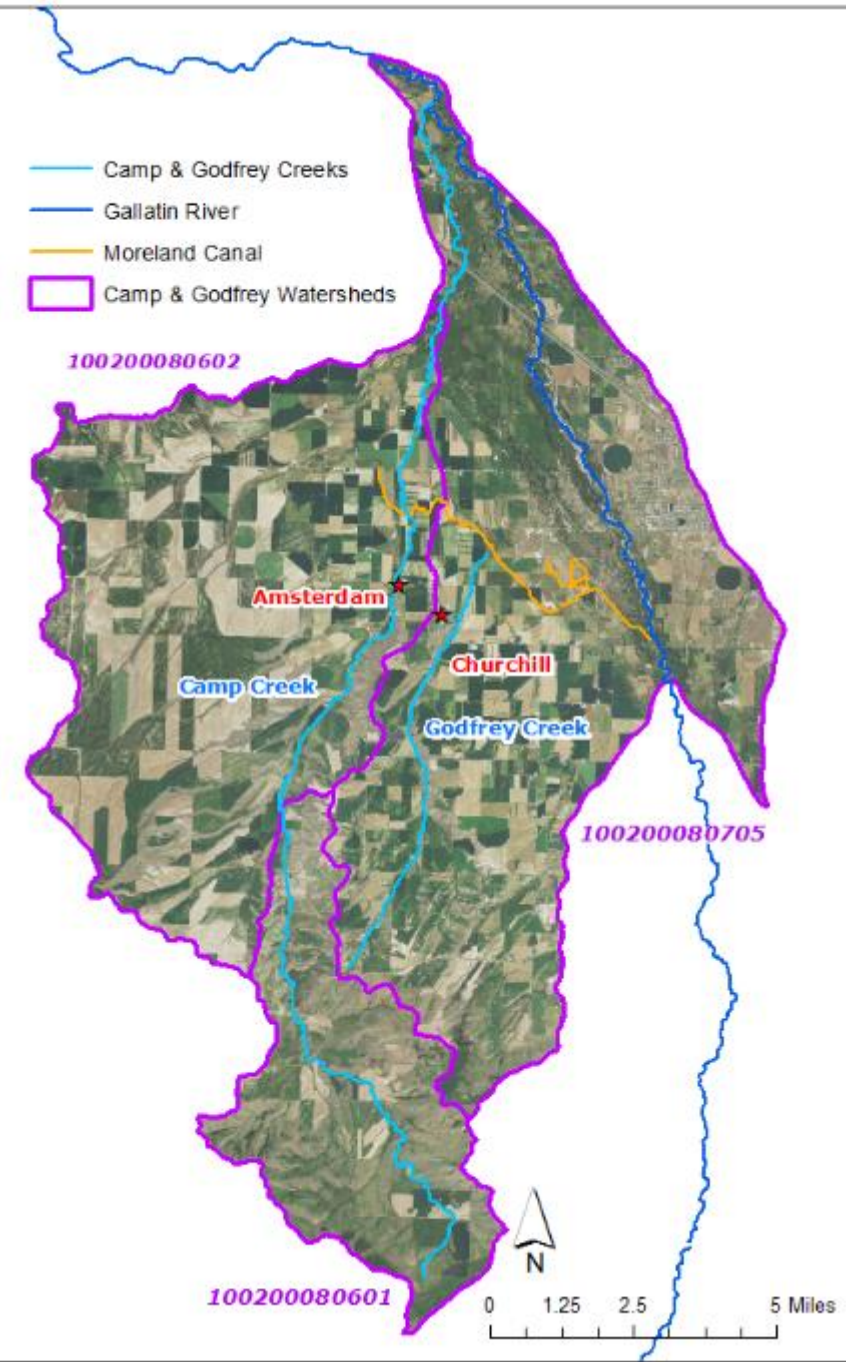
Katie Makarowski - Montana DEQ, Monitoring and Assessment

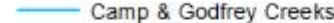







-  Gallatin Watershed, HUC 10020008
-  Gallatin River, Camp & Godfrey Creeks
-  Moreland Canal
-  Camp & Godfrey Watersheds

Sources: Esri, USGS, NOAA



-  Camp & Godfrey Creeks
-  Gallatin River
-  Moreland Canal
-  Camp & Godfrey Watersheds

100200080601

100200080602

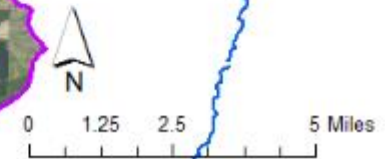
100200080705

Amsterdam

Churchill

Camp Creek

Godfrey Creek



# Water Quality Impairment Summary

| Waterbody Name & Description                                  | Assessment Unit ID | Probable Causes of Impairment                           | Cycle First Listed |
|---|--------------------|---|--------------------|
| <b>Camp Creek,</b><br>headwaters to mouth<br>(Gallatin River) | MT41H002_010       | Nitrogen (Total)  | 1988               |
|   |                    | Phosphorus (Total)                                      | 2014               |
|   |                    | Escherichia coli  | 1988               |
|   |                    | Sedimentation-Siltation                                 | 1988               |
|   |                    | Other anthropogenic substrate alterations               | 2000               |
|   |                    | Physical substrate habitat alterations                  | 2000               |
|   |                    | Alteration in stream-side or littoral vegetative covers | 2000               |
|   |                    | Low flow alterations                                    | 2002               |

| Waterbody Name & Description                                     | Assessment Unit ID | Probable Causes of Impairment                           | Cycle First Listed |
|--|--------------------|---|--------------------|
| <b>Godfrey Creek,</b><br>headwaters to mouth<br>(Moreland Ditch) | MT41H002_020       | Nitrogen (Total)  | 1996               |
|  |                    | Phosphorus (Total)                                      | 1996               |
|  |                    | Excess Algal Growth                                     | 2000               |
|  |                    | Escherichia coli  | 1996               |
|  |                    | Sedimentation/Siltation                                 | 1996               |
|  |                    | Alteration in stream-side or littoral vegetative covers | 2000               |

# 2017 Monitoring Planning

## Goal 1

**Evaluate NWQI success in reducing pollutant loads by comparing current conditions to past and future conditions.**

- Previous data collection for nutrients, *E. coli* and sediment for assessment and TMDL development in 2008 and 2009. Nearly 10 years had passed...
- Establish new baseline in 2017 before project implementation begins.
- Focus on nutrients and *E. coli*; sediment isn't as variable.

## Goal 2

**Identify potential locations where NRCS could implement water quality improvement activities that may most effectively reduce nutrient, sediment and *E. coli* loads from agricultural sources.**

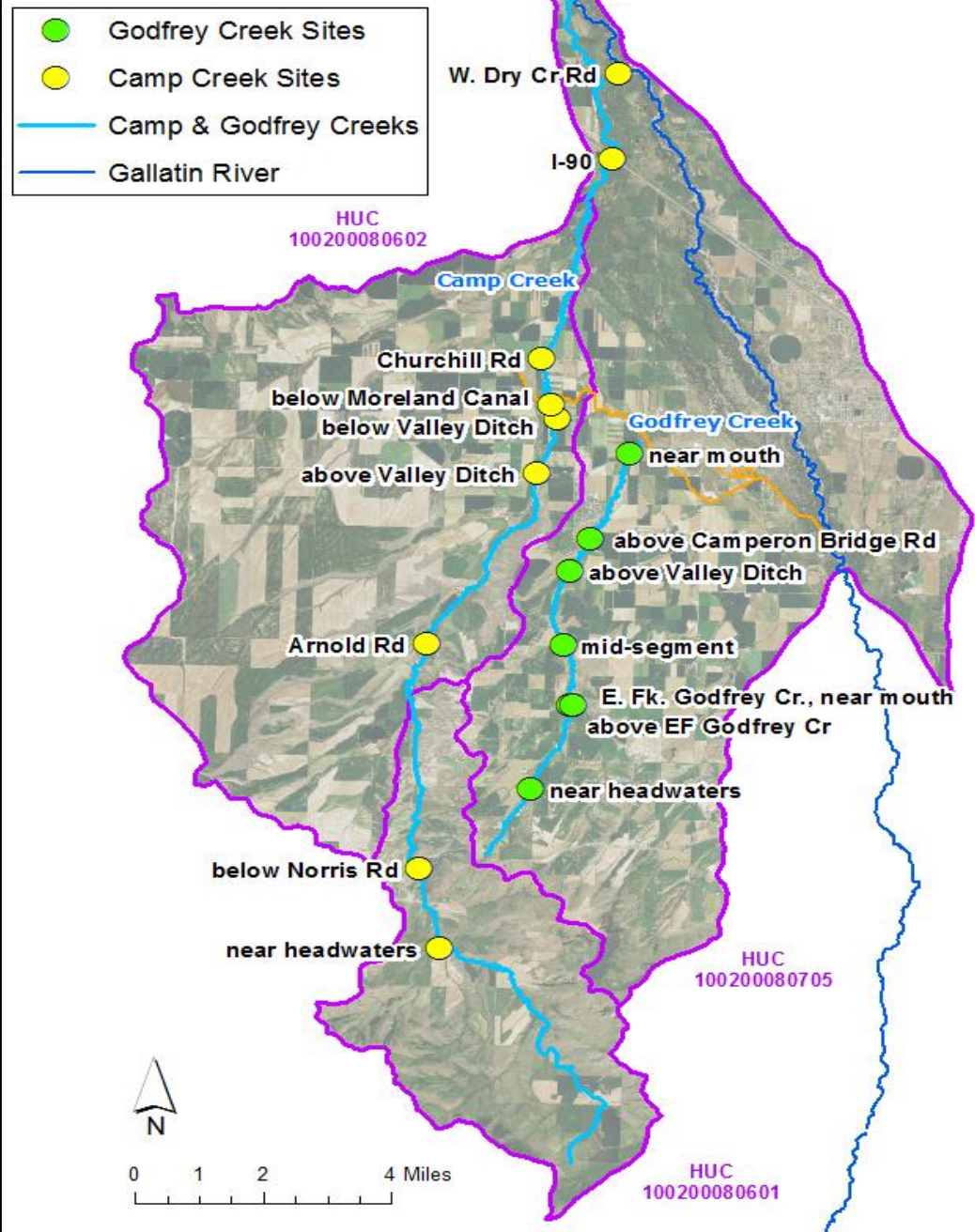
- Investigate differences between spring runoff and summer seasons
- Pair data with land use information to identify potential critical source areas





# NWQI Monitoring Partnership in Camp and Godfrey Creeks

# Site Selection



- Capture conditions along stream: headwaters (above most sources) → mouth (downstream loading)
- Proximity to near- and on-stream agricultural sources
- Bracket significant irrigation inflows/withdrawals
- Sampling the waterbodies themselves, not ditches
- Build relationships with interested landowners

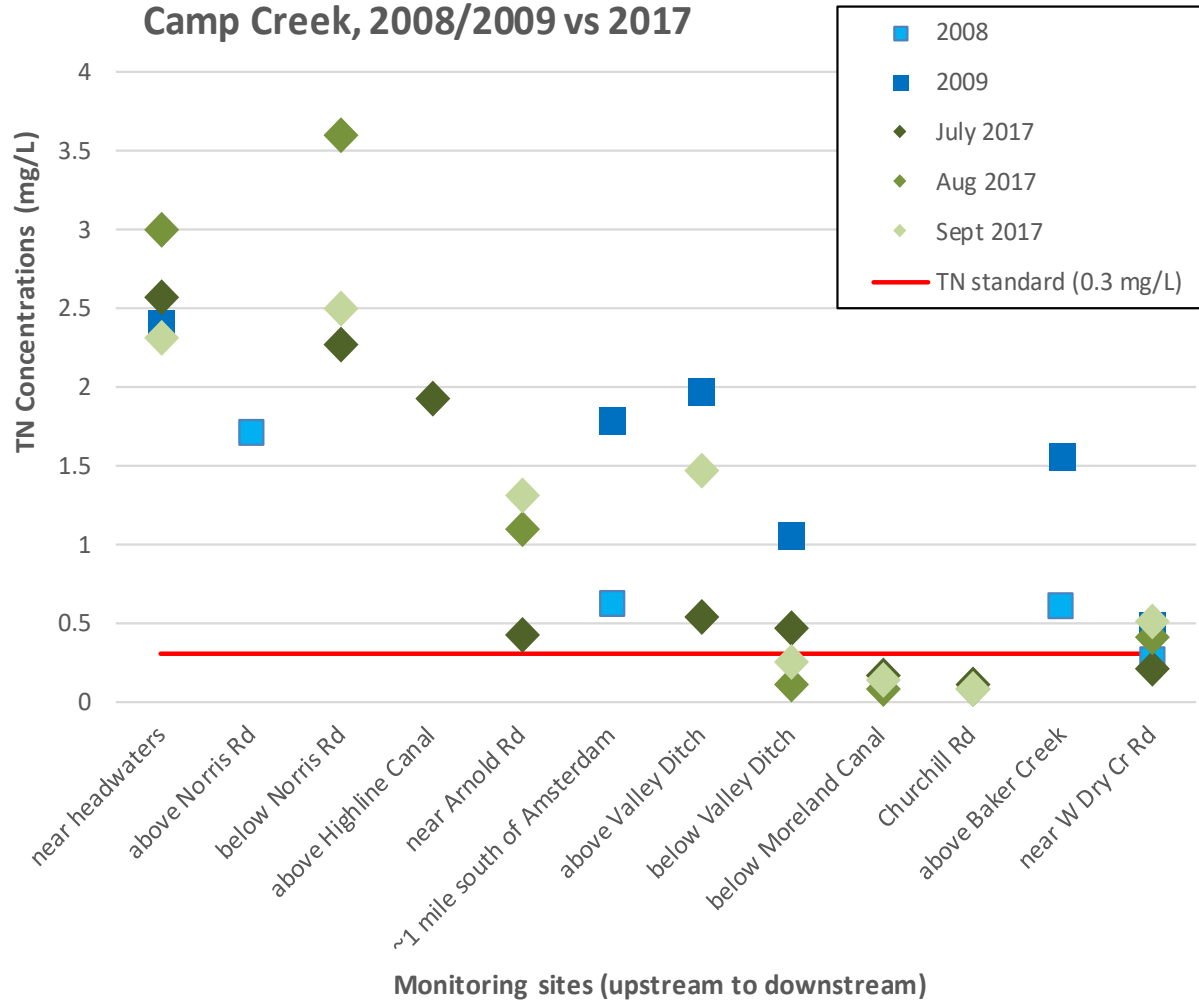
# 2017 Monitoring

Compare current to past conditions...

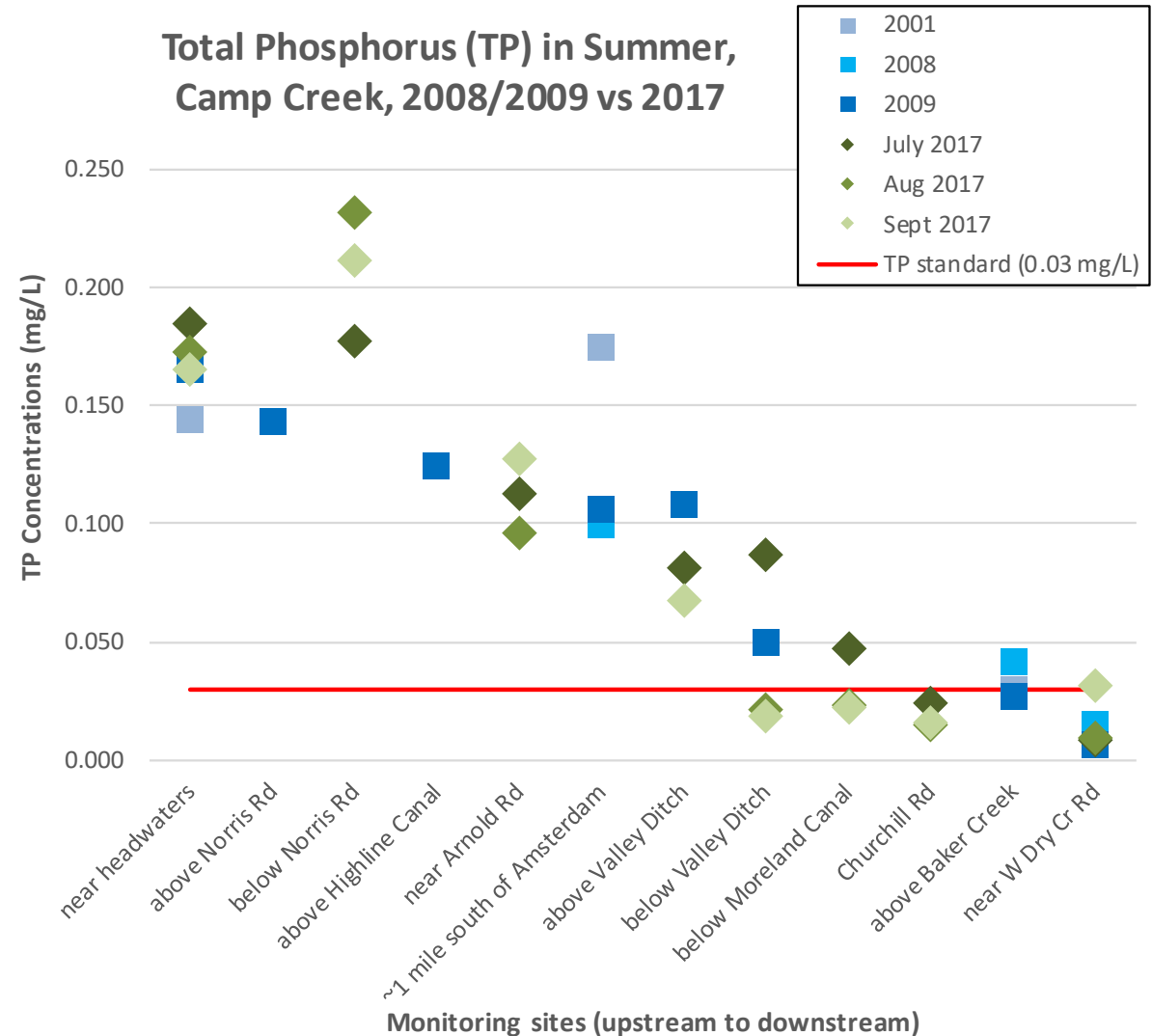


# Comparison: 2008/9 to 2017

## Total Nitrogen (TN) in Summer, Camp Creek, 2008/2009 vs 2017

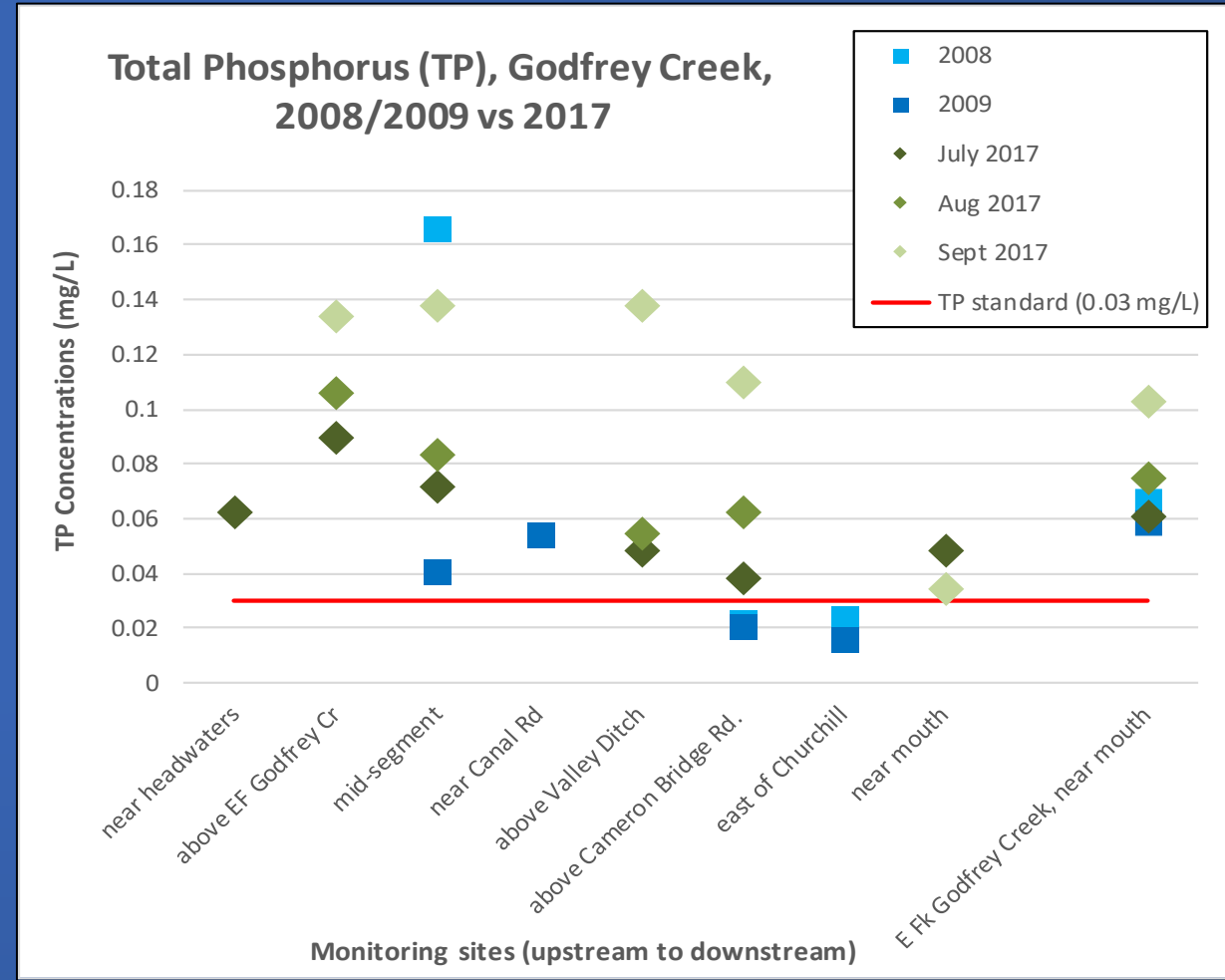
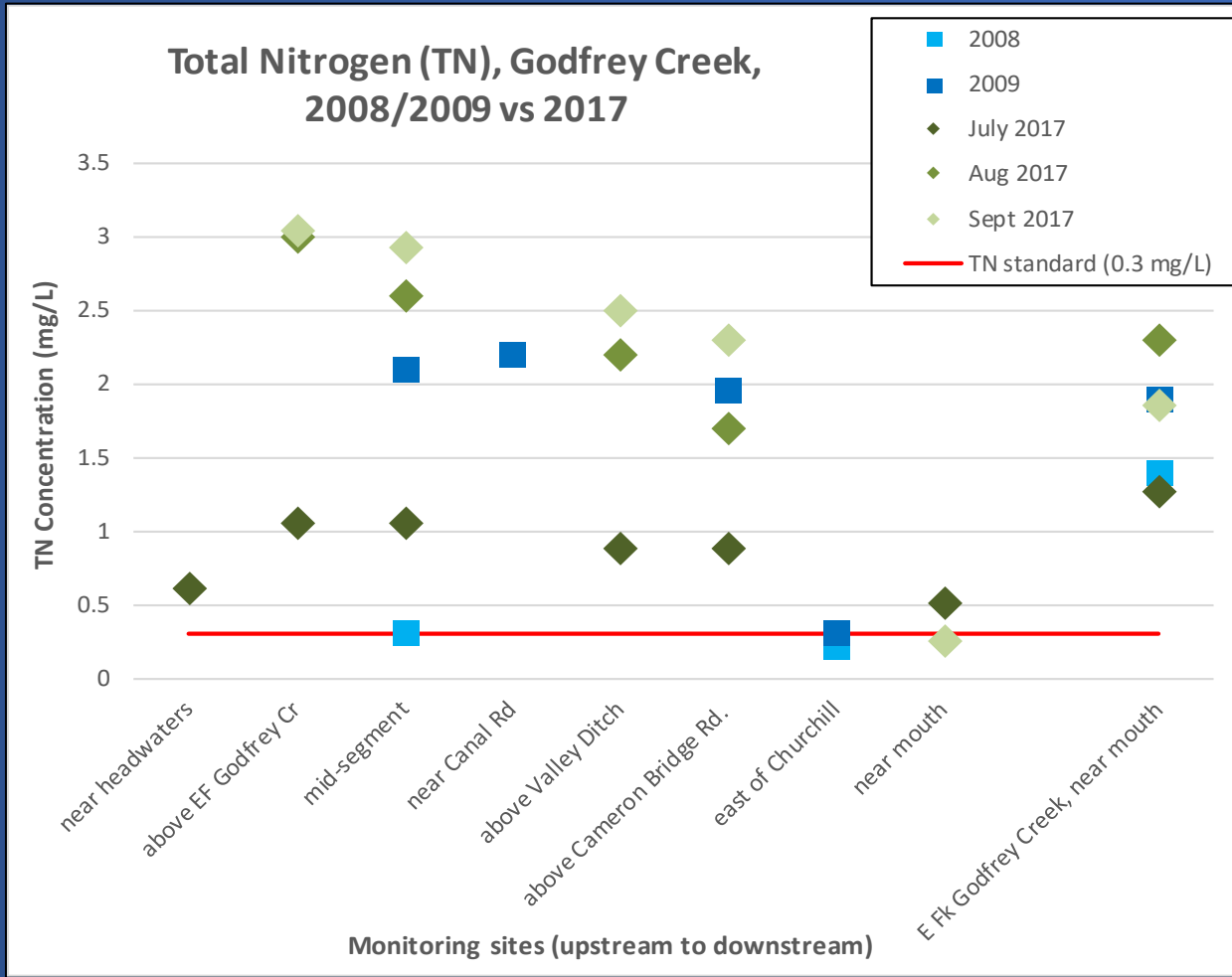


## Total Phosphorus (TP) in Summer, Camp Creek, 2008/2009 vs 2017



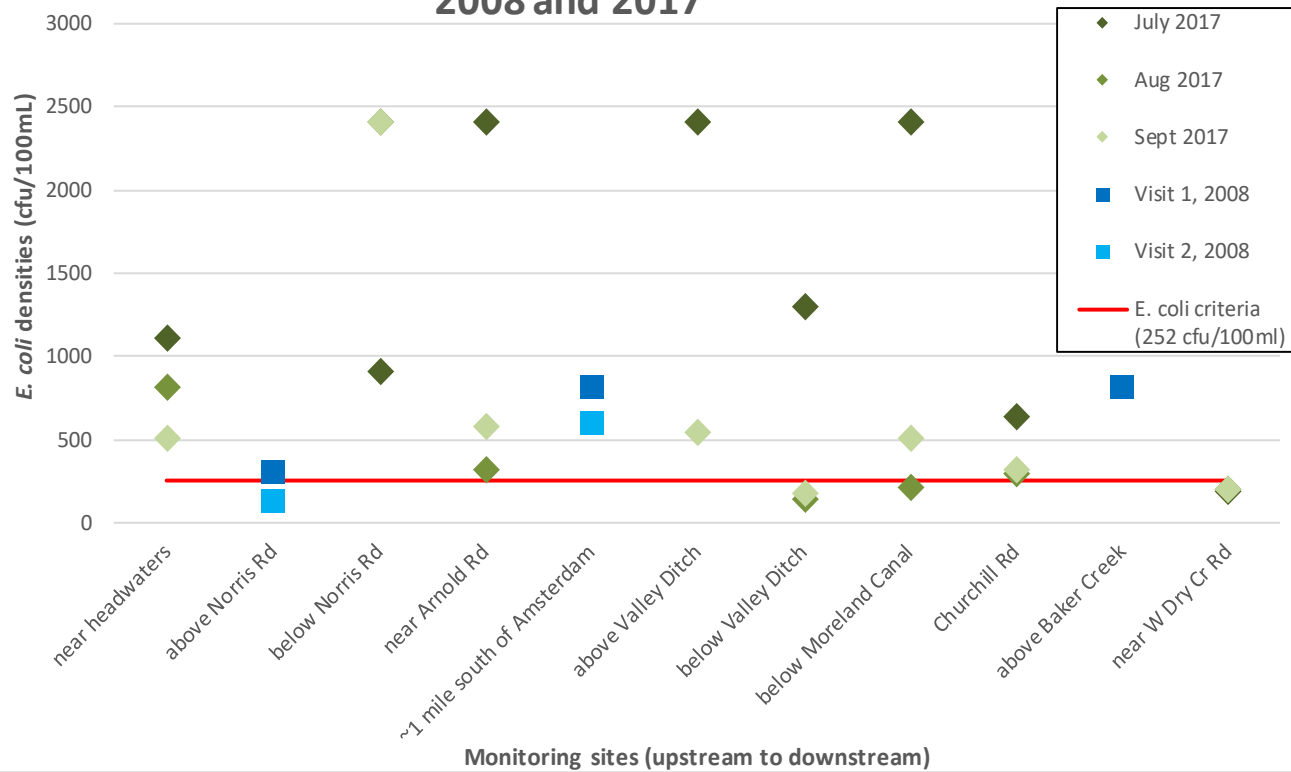


# Comparison: 2008/9 to 2017

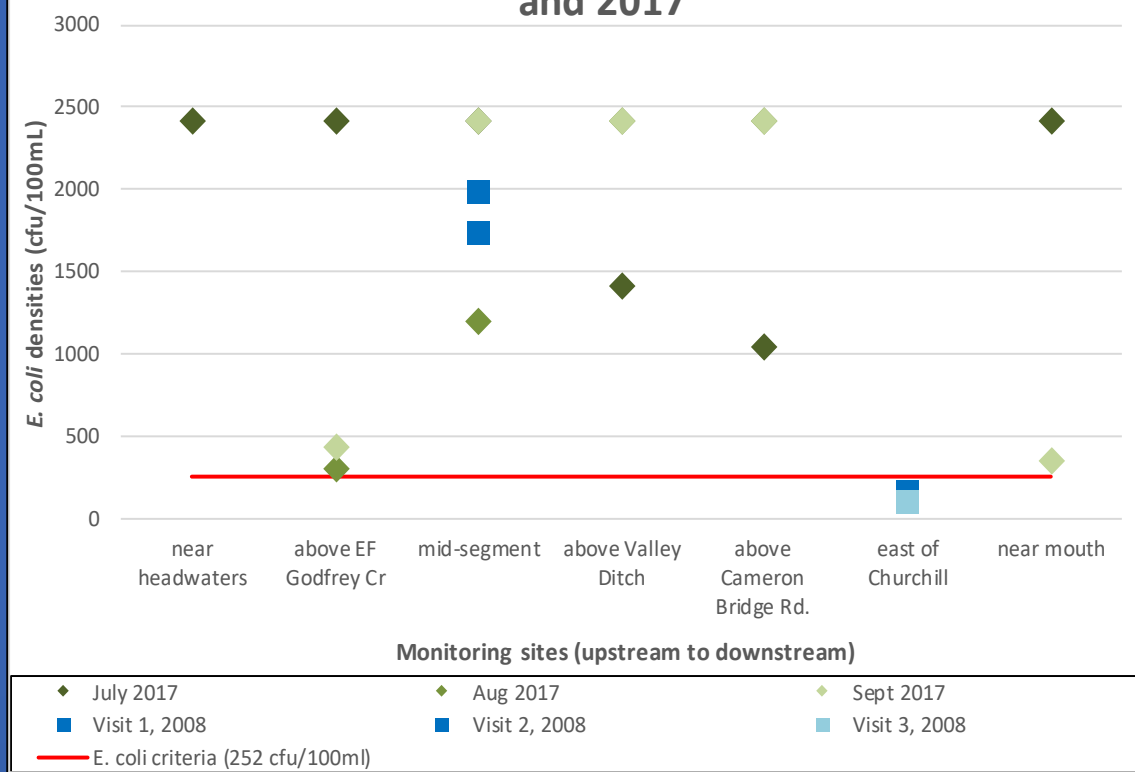


# Comparison: 2008/9 to 2017

## *E. coli* Densities (cfu/100mL), Camp Creek, 2008 and 2017



## *E. coli* Densities (cfu/100mL), Godfrey Creek, 2008 and 2017



# 2017 Monitoring

Compare concentrations and loads relative to  
land use....



# Inform Project Implementation

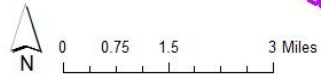
Compare nutrient loads spatially, relative to near- and on-stream agricultural sources

## TN Loads, Quartiles

- June, Q1
- June, Q2
- June, Q3
- June, Q4
- July, Q1
- July, Q2
- July, Q3
- July, Q4
- August, Q1
- August, Q2
- August, Q3
- August, Q4
- September, Q1
- September, Q2
- September, Q3
- September, Q4

## Agriculture Pollution Potential

- High
- Medium
- Low



HUC  
100200080601

HUC  
100200080705

## TP Loads, Quartiles

- June, Q1
- June, Q2
- June, Q3
- June, Q4
- July, Q1
- July, Q2
- July, Q3
- July, Q4
- August, Q1
- August, Q2
- August, Q3
- August, Q4
- September, Q1
- September, Q2
- September, Q3
- September, Q4

## Agriculture Pollution Potential

- High
- Medium
- Low



HUC  
100200080601

HUC  
100200080705

# Future Monitoring Planning

- Currently working on MEANSS model to estimate current and future septic influence.
- Return in 5-7 years to compare future conditions to baseline and track progress toward meeting water quality goals
- Continue monitoring partnership
- Future sampling designs should consider influence of ditches, and should strive for statistical comparisons to evaluate improvement.
- Gallatin Local Water Quality District includes Camp Creek in long-term surface water monitoring network.

