

## TMDL Progress: Nutrients & B WTF Bug Monitoring Results



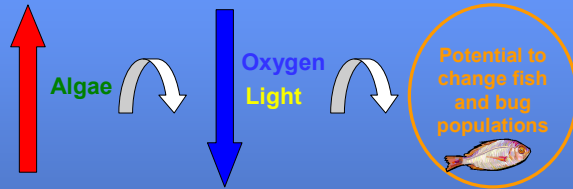
Kristin Gardner  
Blue Water Task Force - Executive Director  
and  
MSU PhD Candidate



## Impaired Streams For Nutrients



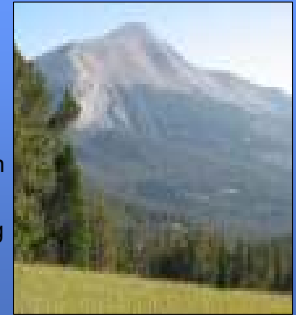
## Impact of Elevated Nutrients on Stream Health?



## Sources of Nitrogen

### Human Sources:

- wastewater
- Atmosphere
- Fertilizer
- Geology
- Atmospheric Deposition
- Organic matter
- Animal waste
- Animal waste
- Forest/ riparian clearing

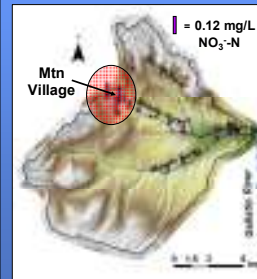


## What we have learned so far..

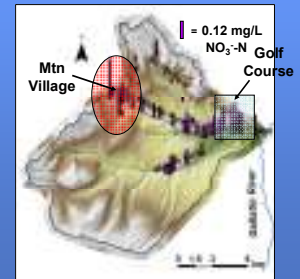


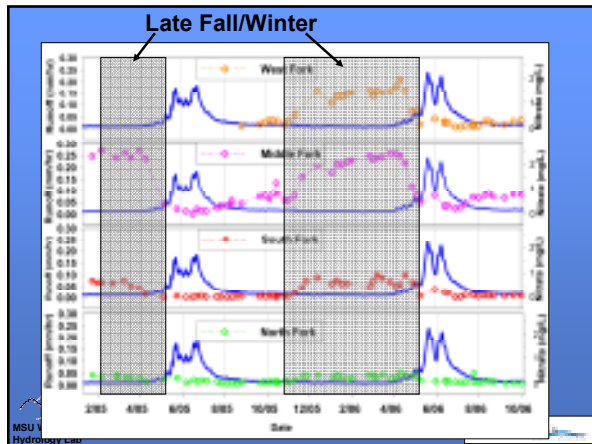
## Complex Spatial and Seasonal Patterns

### SUMMER



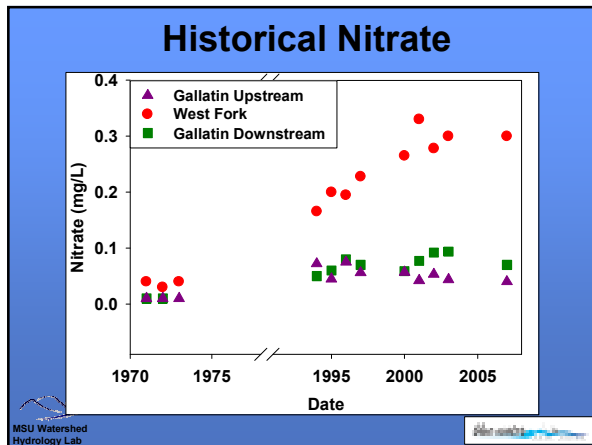
### WINTER





### Is excess nitrogen impacting stream health ???

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### BWTF Stream Bug Monitoring Program

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### Why Study Stream Bugs?

- Sensitive to physical and chemical changes in habitat
- Used as Indicators of water quality
  - Type and amount of stream bugs are used to calculate an index to describe water quality
- Live in water year-round
- Easily collected for analysis

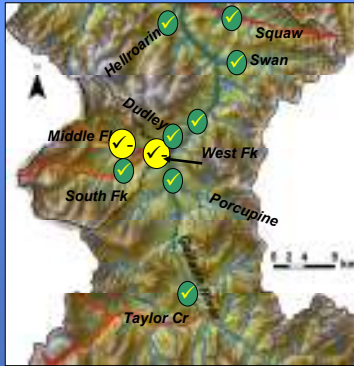
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### Blue Water Task Force Bug Sampling Program

- Collect bugs twice a year
- Sites on the mainstem Gallatin and its tributaries.
- Samples are sent to lab for analysis
- Measure type and percentages of bugs and calculate indexes
- BWTF receives detailed report available to public

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## What we have learned so far...

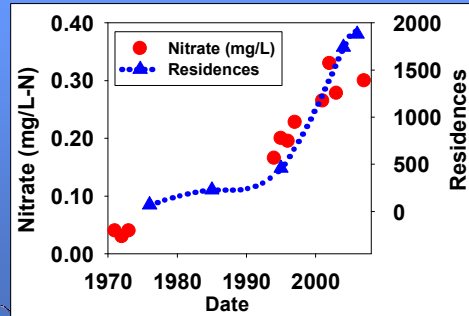


Not Impaired  
Impaired

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## Why we must continue to monitor the Upper Gallatin and its tributaries.....



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## Other Graduate Students on the Big Sky Nitrogen Project:

- [Becca McNamara](#) – nitrogen cycling in streams
- [Natalie Campos](#) – mapping land use/ land cover
- [Galena Ackerman/Nathan Park](#)– geologic weathering of nitrogen.
- [Galena Ackerman/Trish Jenkins](#): nitrogen/Phosphorus limitation experiments

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