



Streamwater Nitrogen Export in Mountain Watersheds

**Kristin Gardner - PhD Candidate
Brian McGlynn – Major Professor**

**Watershed Hydrology Lab
Montana State University**

TMDL Nutrient Loads for Upper Gallatin Watershed

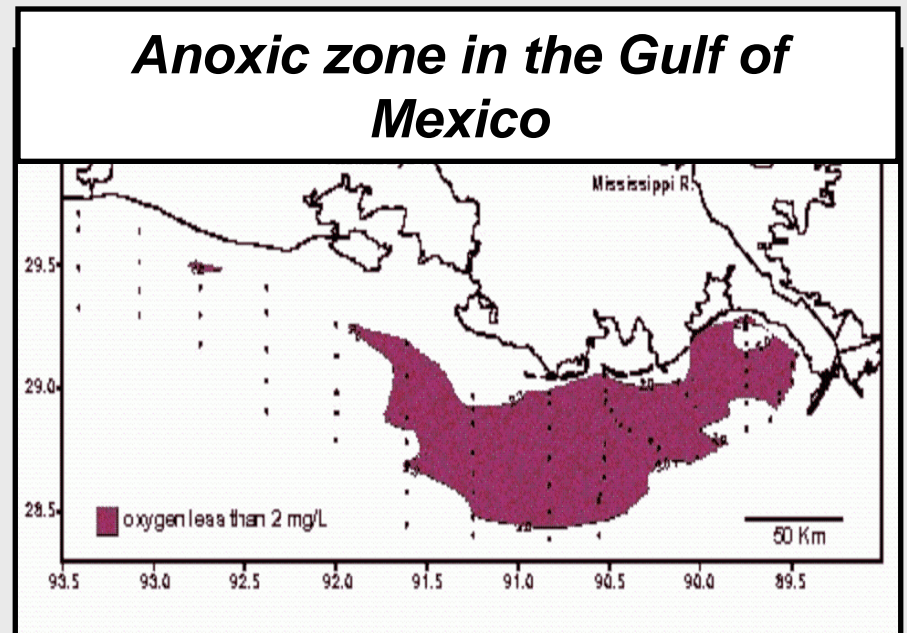
Four streams in the Upper Gallatin watershed listed as impaired for nutrients:

- Squaw Creek
- Middle Fork of the West Fork of the Gallatin River
- South Fork of the West Fork of the Gallatin River
- West Fork of the Gallatin River



Excess Nitrogen Causes Water Quality Decline

Eutrophication



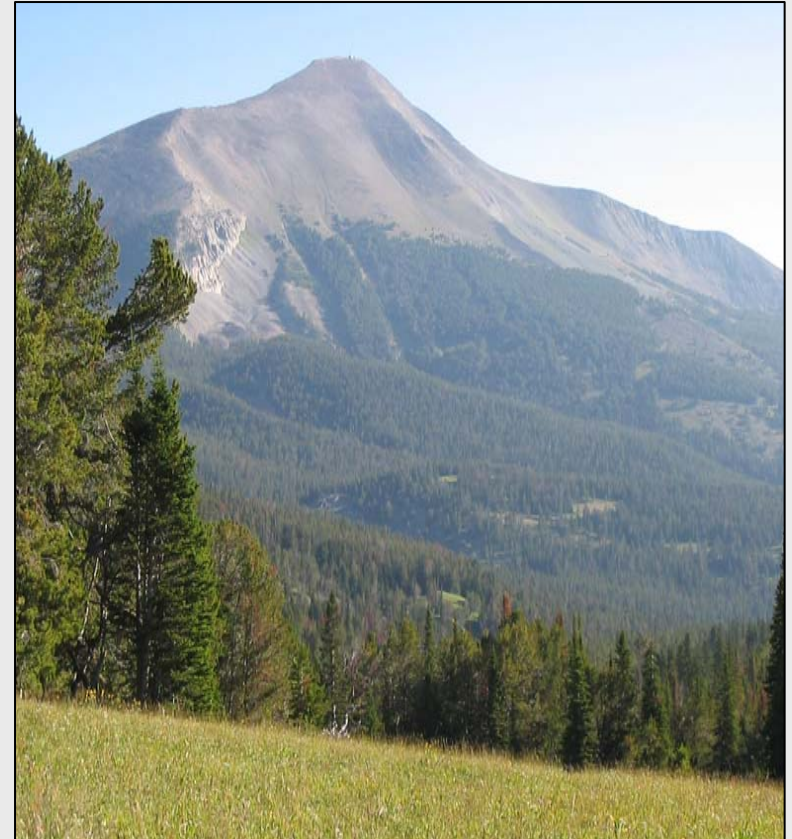
Sources of Nitrogen

Natural Sources:

- Atmosphere
- Geology
- Organic matter
- Animal waste

Anthropogenic Sources:

- Wastewater
- Fertilizer
- Atmospheric Deposition
- Animal waste
- Forest/ riparian clearing



Study Methodology

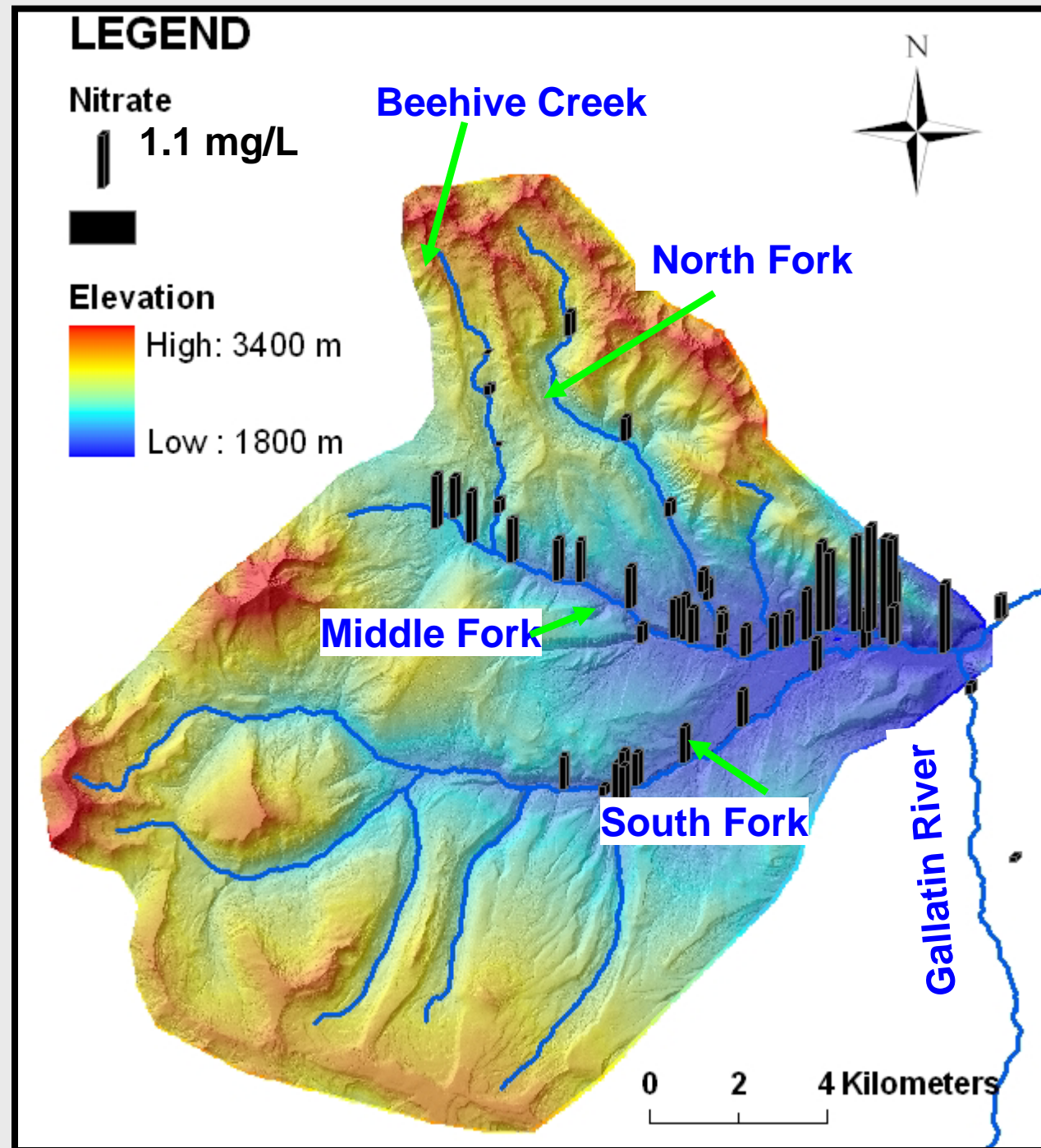
1. Map land cover and watershed characteristics.
 - a) Satellite imagery and
 - b) Airborne laser swath mapping (ALSM).

2. Water quality sampling
 - a) “Spatial Snapshot”
 - b) Weekly



“Spatial Snapshot”

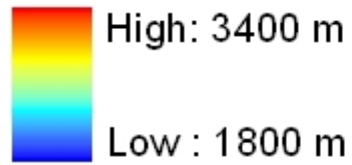
February
12, 2006



LEGEND

● Weekly Sampling Spots

Elevation



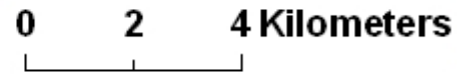
Beehive Creek

North Fork

Middle Fork

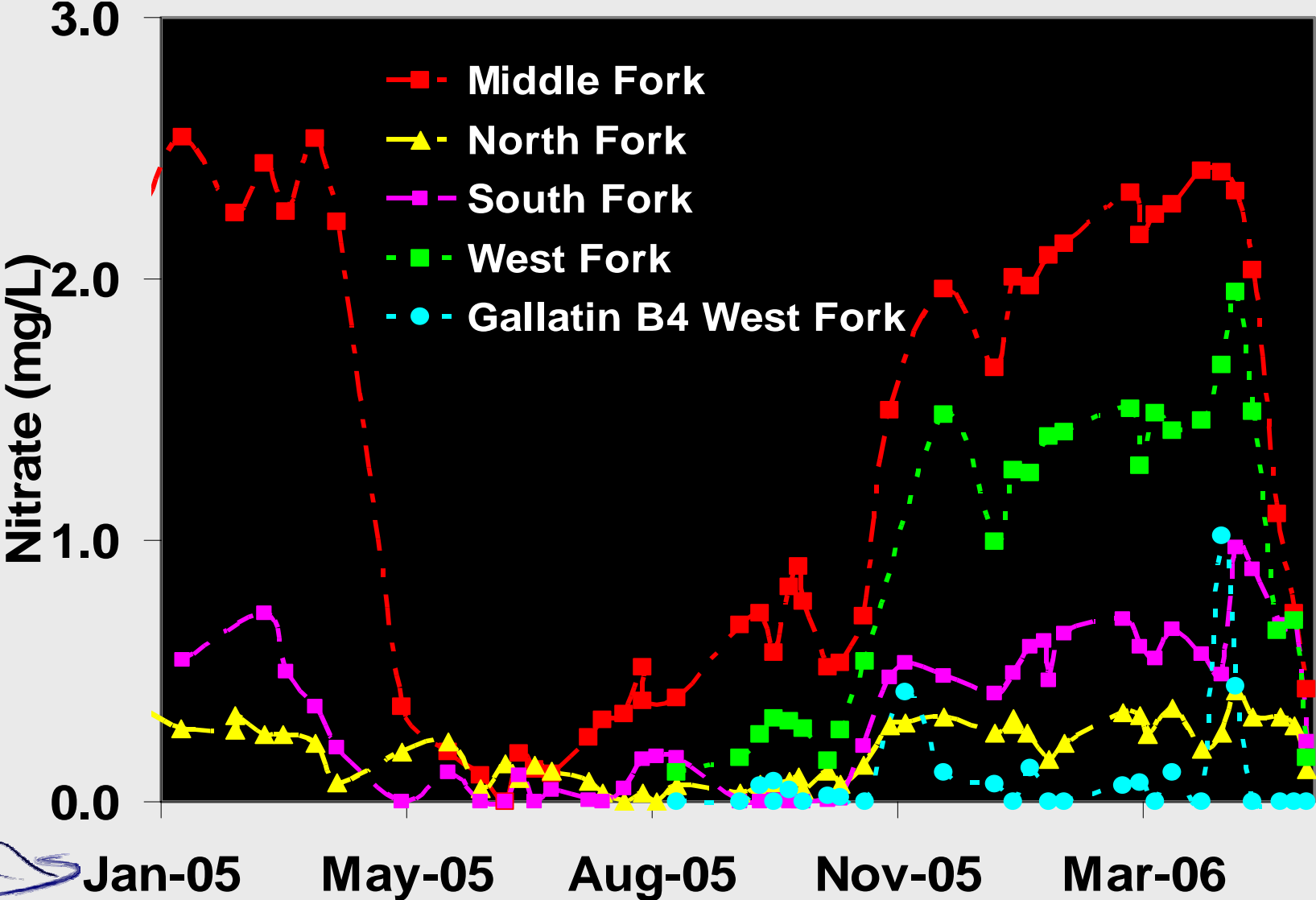
South Fork

Gallatin River



MSU Watershed
Hydrology Lab

Weekly Sampling



Other Graduate Students on the Big Sky Project:

- ◆ **Becca McNamara** – Nitrogen cycling in streams
- ◆ **Natalie Campos** – mapping land use/ land cover
- ◆ **Levia Shoutis** – current riparian condition in the West Fork watershed, and relationship between topography and of the extent of riparian zone.

