U W – Discovery Farms

Introduction to the Program

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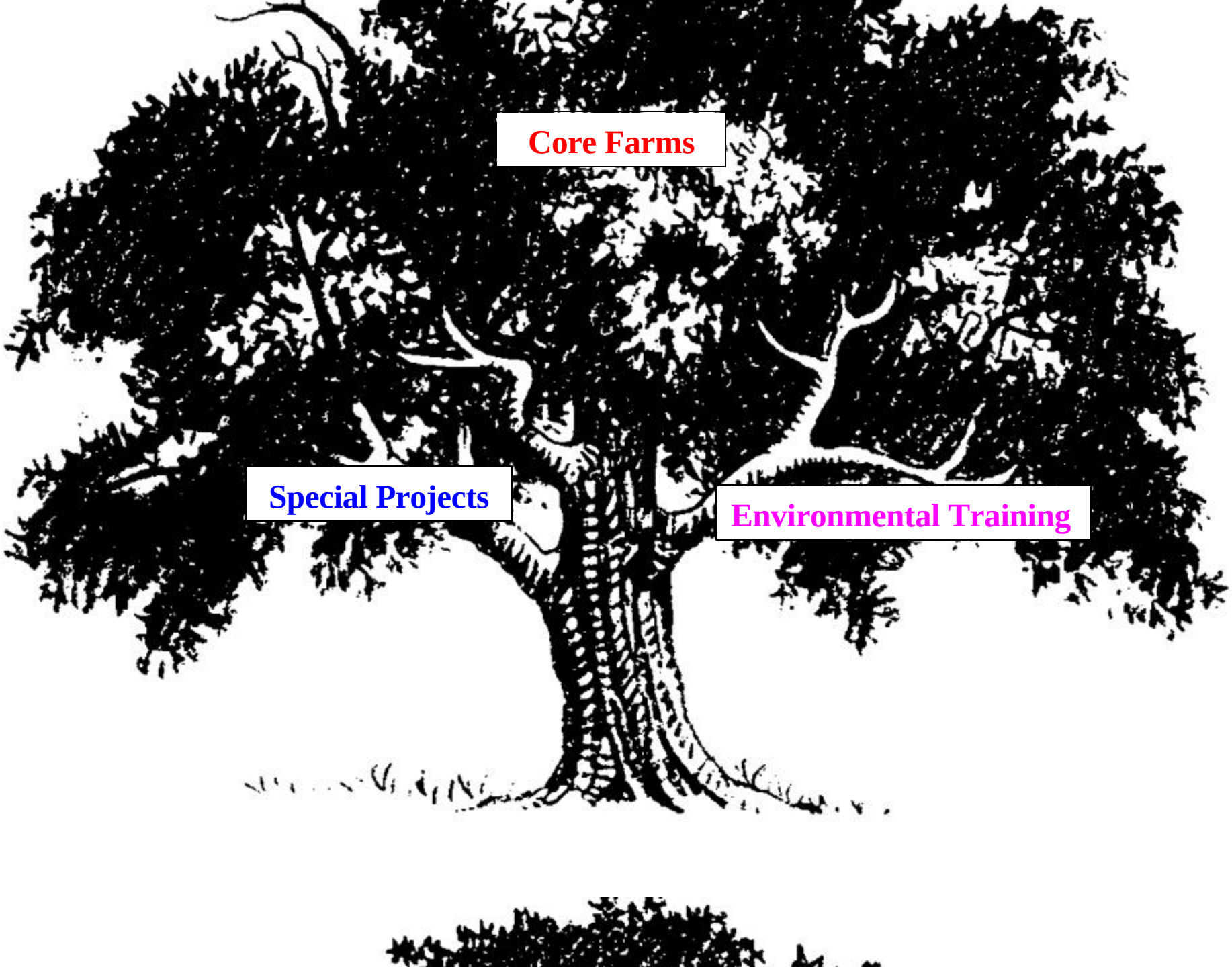
Core Farms
Special Projects
Environmental Training

UW Discovery Farms Mission Statement

- Determine the impacts of production agriculture on the environment, while learning the economic and environmental ramifications of adopting Best Management Practices on a diverse group of Wisconsin farms.

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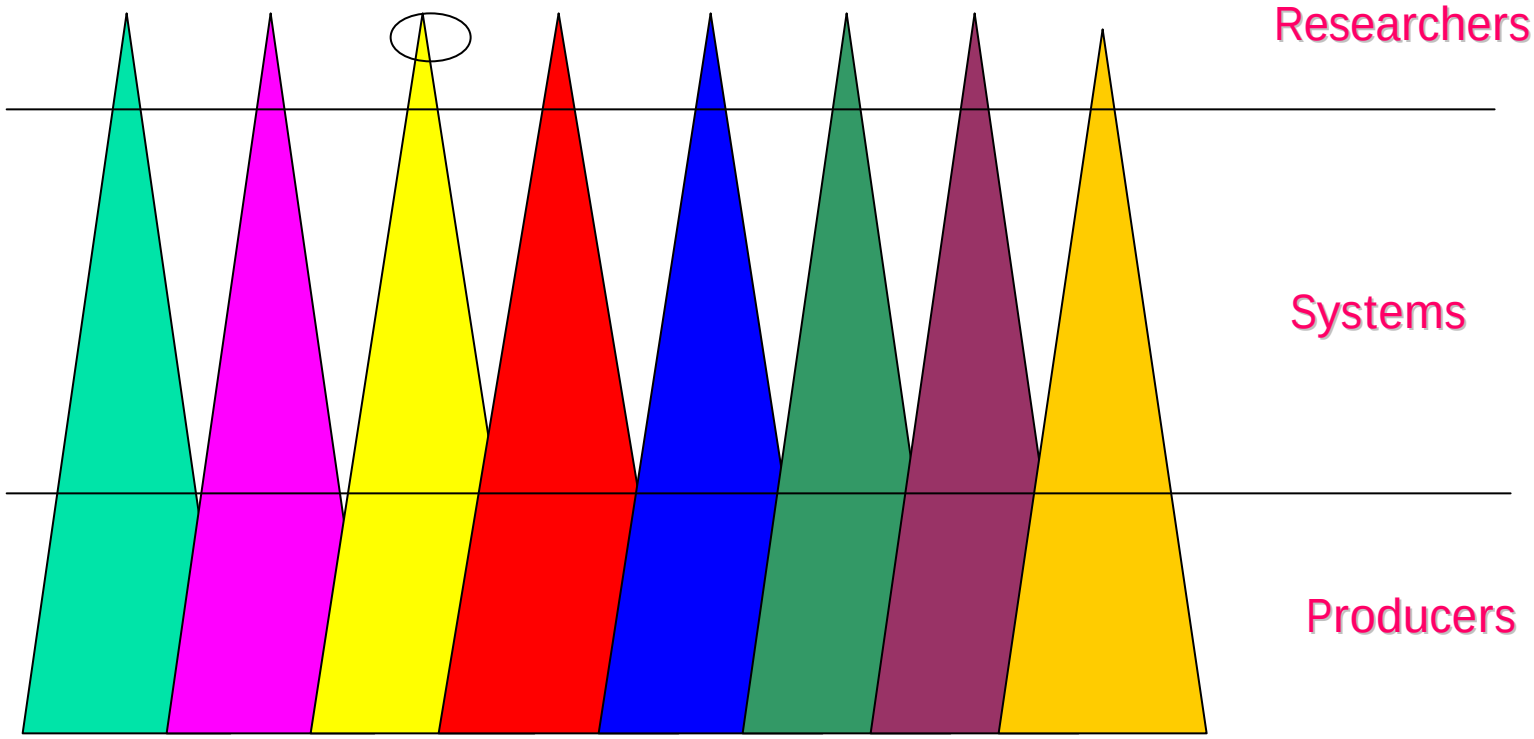
- Determine the impacts of production agriculture on the environment, while learning the economic and environmental ramifications of adopting Best Management Practices on a diverse group of Wisconsin farms.

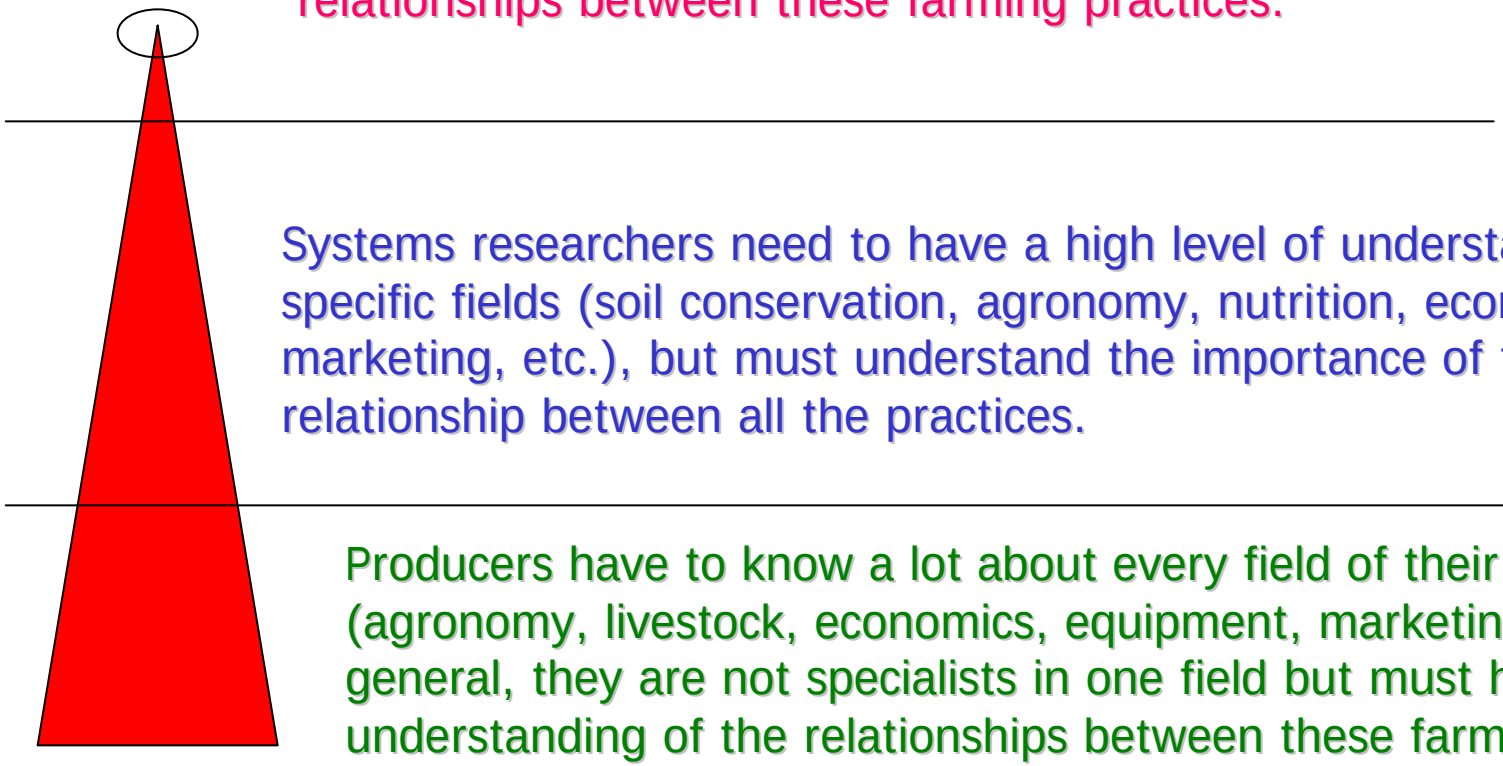
- Through these studies, we will provide information and improve communications on environmental and economic issues between producers, consumers, the research community, policy makers and agency personnel.

Why Systems Research??



Why Systems Research??

Top researchers have to know everything about a very narrow part of their field (nitrogen digestion, etc). In general, they know little about other fields or the relationships between these farming practices.



Systems researchers need to have a high level of understanding of specific fields (soil conservation, agronomy, nutrition, economics, marketing, etc.), but must understand the importance of the relationship between all the practices.

Producers have to know a lot about every field of their farm (agronomy, livestock, economics, equipment, marketing, etc. In general, they are not specialists in one field but must have a strong understanding of the relationships between these farming practices.

How to achieve our mission?

- Determine baseline measurements for a variety of farms
- Determine the effectiveness of BMPs (environmental & economic)
- Document effective implementation methods and production practices
- Document the potential impacts of proposed rules and regulations

How did the process work?

- Statewide call for cooperators
  - 36 farms applied
  - Steering committee selected 16
- Farms selected if they represent “typical operations / issues” in Wisconsin

How does process work?

- Staff prepares introductory materials:
  - Type of farm (acres, animals, production practices, manure handling, etc.)
  - Resources (soil, water, air)
  - Maps
  - Producers issues identified
  - Review team issues identified
  - Environmental assessment issues identified

How does process work?

- Staff identifies potential research
  - Nutrient loading to streams / lakes
  - Soil erosion rates (tillage affects)
  - Meeting a phosphorus standard
  - Dietary phosphorus levels
  - Manure characteristics and handling
- Staff discusses potential projects with producer and local advisory committee to make sure we are on track.

How does process work?

- Once projects identified and funding secured, monitoring system designed and installed by USGS / DNR

- Baseline data collection begins
  - Water quality data
  - Agronomic, livestock and financial data
  - Other data as needed

How does process work?

- Once baseline data is complete, issues are identified and research teams are invited to design project.
  - Phosphorus index
  - Buffers
  - Changes in tillage, residue, rotations, etc.
  - Manure handling practices
  - Other

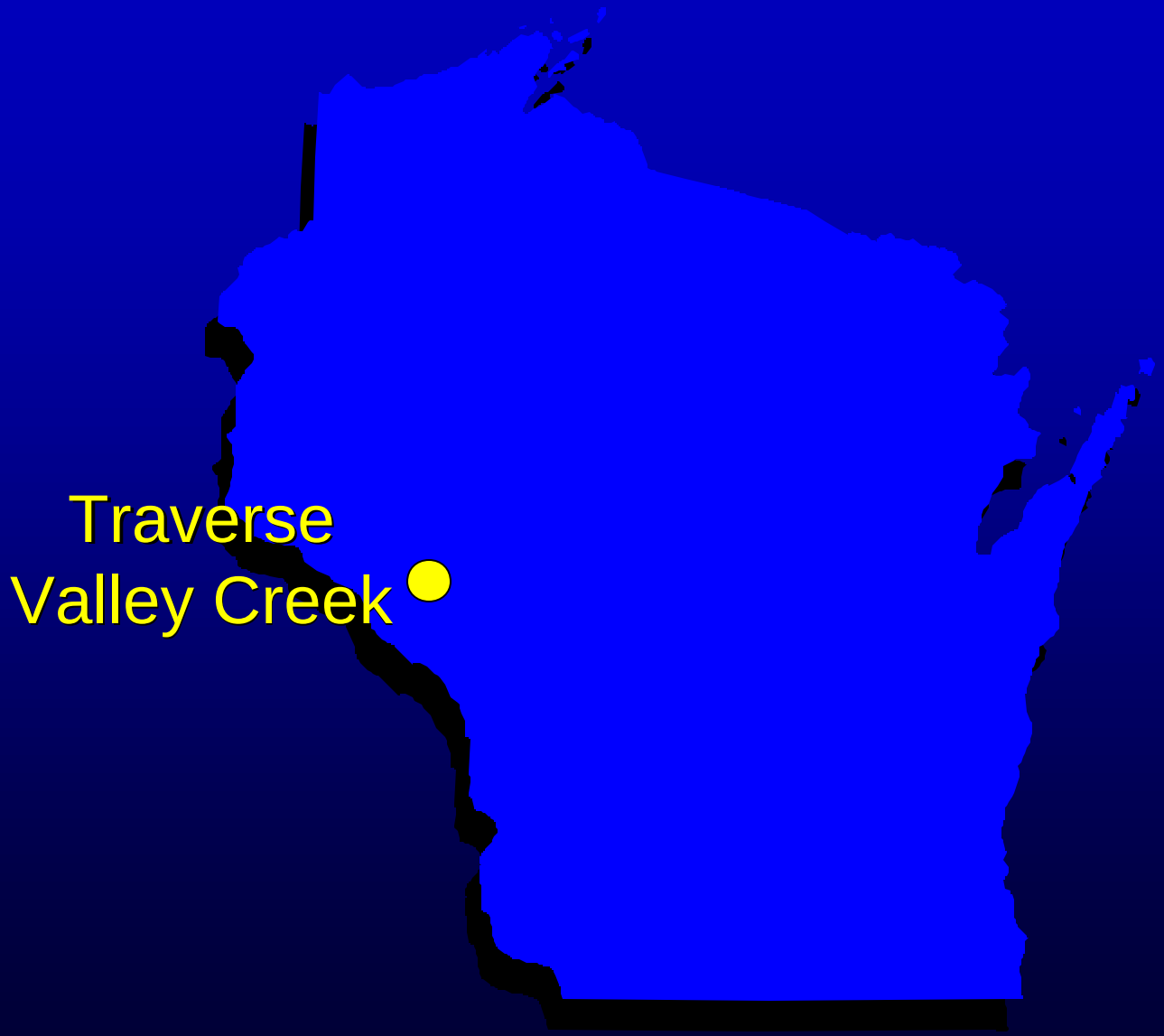
During baseline collection we also collect the following data:

- Kernel Issues (done on all farms)
- Issues specific to the operation

Kernel Issues (all farms)

- Nutrient Management Plans
- Soil Conservation Plans
- Sensitive area identification
- Phosphorus indexing

Bragger Farm Location



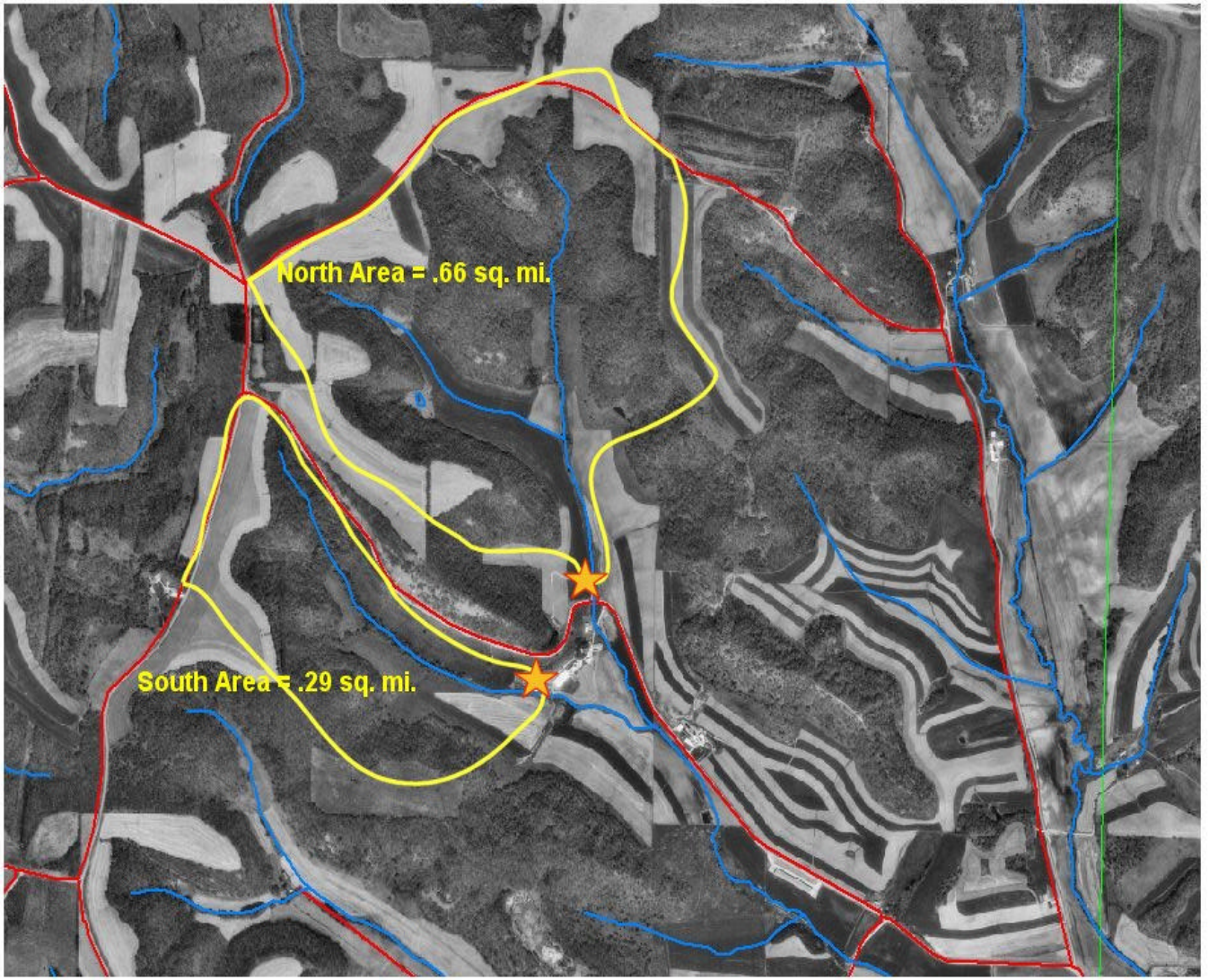
How do we evaluate: Paired-Basin Design

- Treatment and Control Basins
- Monitoring before BMP implementation to establish relationship
- Monitoring after BMP implementation
- Premise is that the pre-post relationship will change if the BMP has had an appreciable effect.

Constituents Sampled to Date

- Suspended Solids
- Total Solids
- Suspended Sediment
- Total Phosphorus
- Total Dissolved Phosphorus
- Dissolved Reactive Phosphorus (ortho-p)
- Dissolved Ammonia
- Dissolved Nitrate + Nitrite
- Total Kjeldahl Nitrogen
- Total Kjeldahl Nitrogen - Dissolved
- Fecal Coliform Bacteria
- Chloride
- Conductivity
- pH

Traverse Valley Creek Sampling Locations



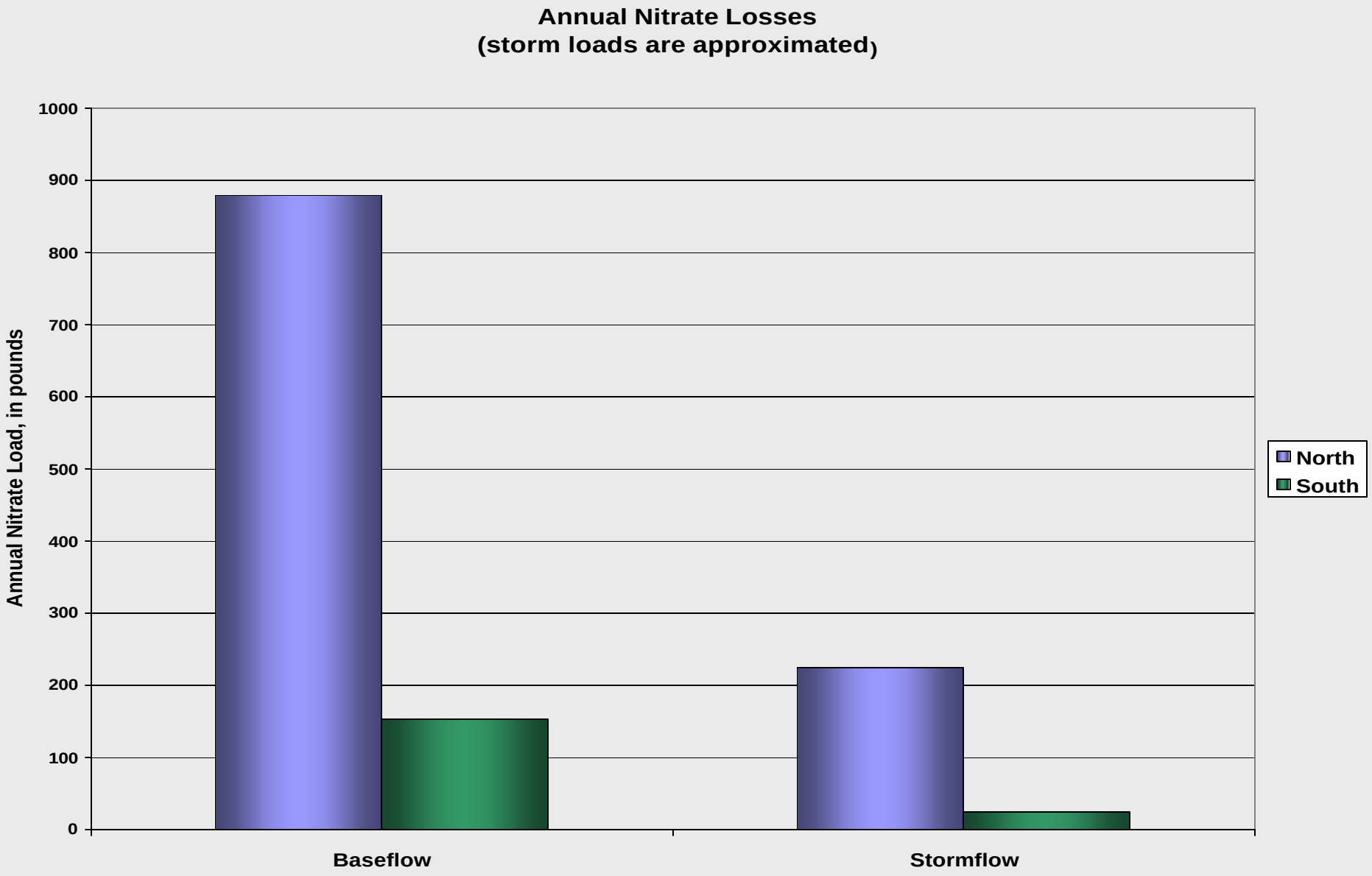
Baseflow: What we know

- Baseflow accounts for nearly 90% of annual streamflow in each basin
- GW divides do not equal SW divides
- Water is bypassing the gaging stations
- Baseflow at the north gage is about 4 times that of the south gage
- Concentrations of phosphorus are higher at the south gage
- Concentrations of nitrate are higher at the north gage
- Most of the nitrate load occurs during baseflow

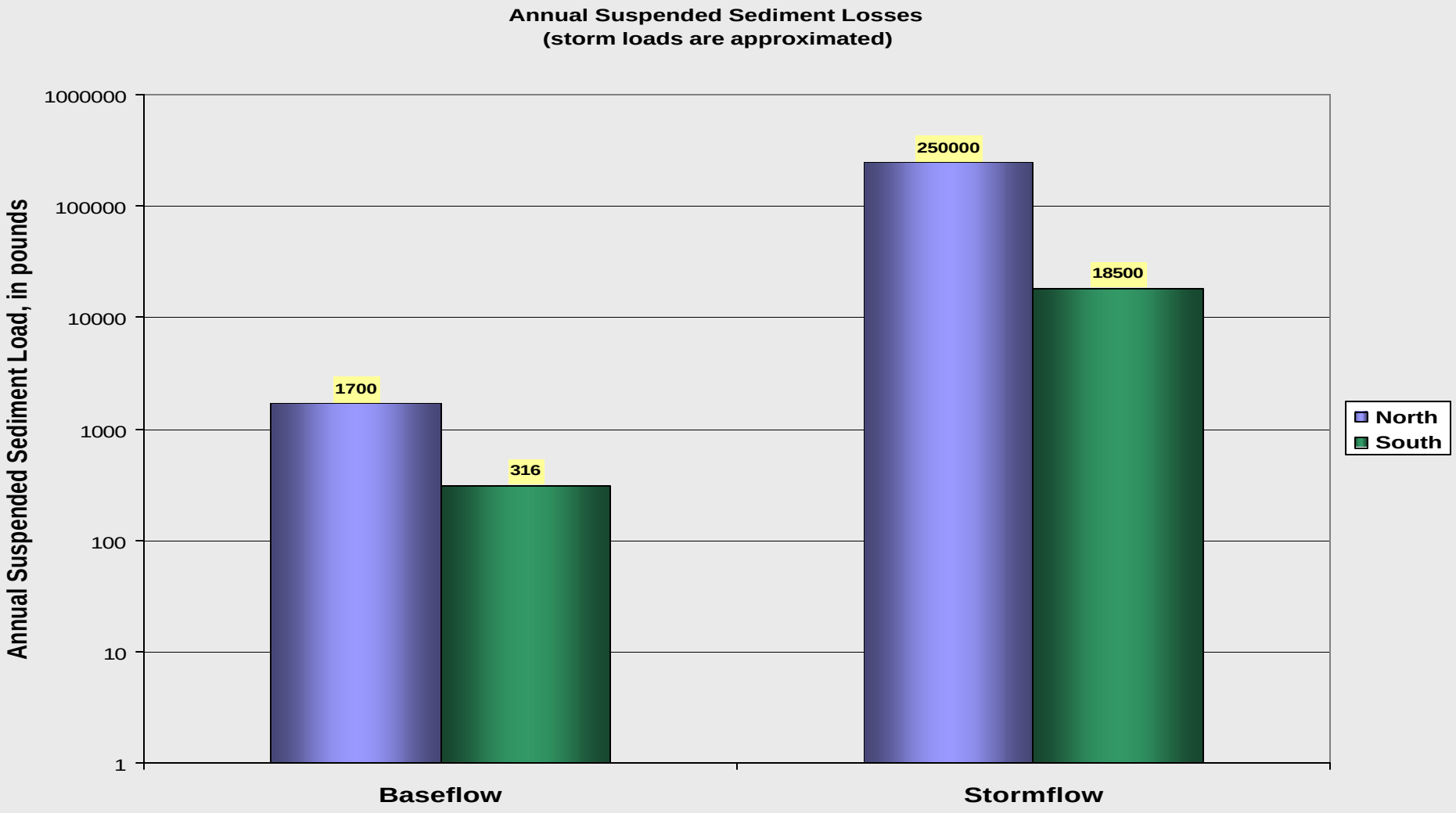
Average Baseflow Concentration, in mg/L

Constituent	North	South	Factor
Total Phosphorus	0.022	0.049	2x (S)
Diss. Phosphorus	0.015	0.032	2x (S)
Nitrate	2.48	1.64	1.5x (N)
Total Nitrogen	2.62	1.87	1.4x (N)

Baseflow vs Stormflow: Annual Nitrate Loads

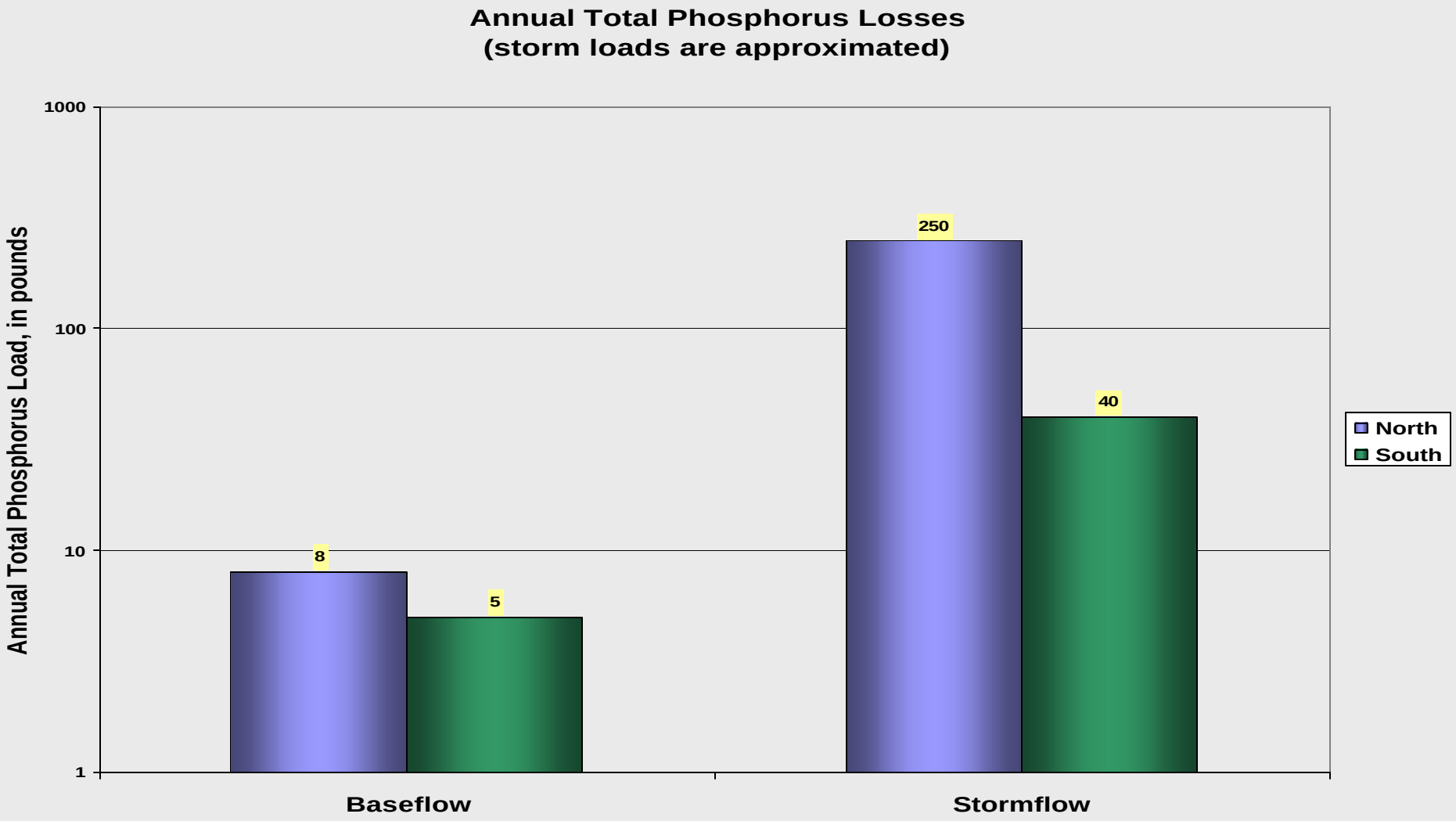


Annual Sediment Loads



Nearly 100% of sediment load delivered during storms

Annual Phosphorus Loads



Yields of TP are 5x greater at the north basin

Summary: Baseflow

- Baseflow accounts for nearly 90% of annual streamflow in each basin.
- Baseflow at the north gage is about 4 times that of the south gage.
- Baseflow loads of solids, phosphorus are minimal.
  - Concentrations of phosphorus are higher at the south gage.

Summary: Baseflow

- Baseflow loads of N are significant (Nitrate).
  - Concentrations of nitrate are higher at the north gage.
  - Structural BMPs will likely not reduce concentrations significantly.
- Underlying geology is complicated.
  - Unsure of the sources of baseflow (and N) or time of travel, making it a poor location for N studies (unless GW work/modeling are done).

Summary: Storm Runoff

- Storm runoff accounts for only 10% of annual streamflow in each basin, but:
  - Over 90% of sediment and phosphorus losses in each basin occur during storms.
  - A majority of these losses occur during only a few storms.
- Storm runoff at the north gage is about 2 times that of the south gage (per unit area).

Summary: Storm Runoff

- We have 12 “good” pairs of storm loads for the north and south basins.
  - Sediment loads were 10x greater (per unit area) at the north basin.
  - Total phosphorus loads were 5 times greater at the north basin.
  - On average, dissolved P comprises ~20% of storm loading.
  - Relationships between the north and south basins look good for sediment, TP, N; not as good for DP.

Summary: Storm Runoff

- Loads of sediment and phosphorus are distributed throughout a storm similarly to volume and to each other.
  - If BMPs control one, the other will also be controlled.