South Tobacco Creek Manured Watershed Runoff Study

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Water Quality Management
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Acknowledgements

This project has been possible because of the valued cooperation and assistance of local producers in the watershed, the Deerwood Soil & Water Management Association, Environment Canada, Prairie Farm & Rehabilitation Administration, Manitoba Agriculture, and Manitoba Pork est.

Why Is Data Being Collected?

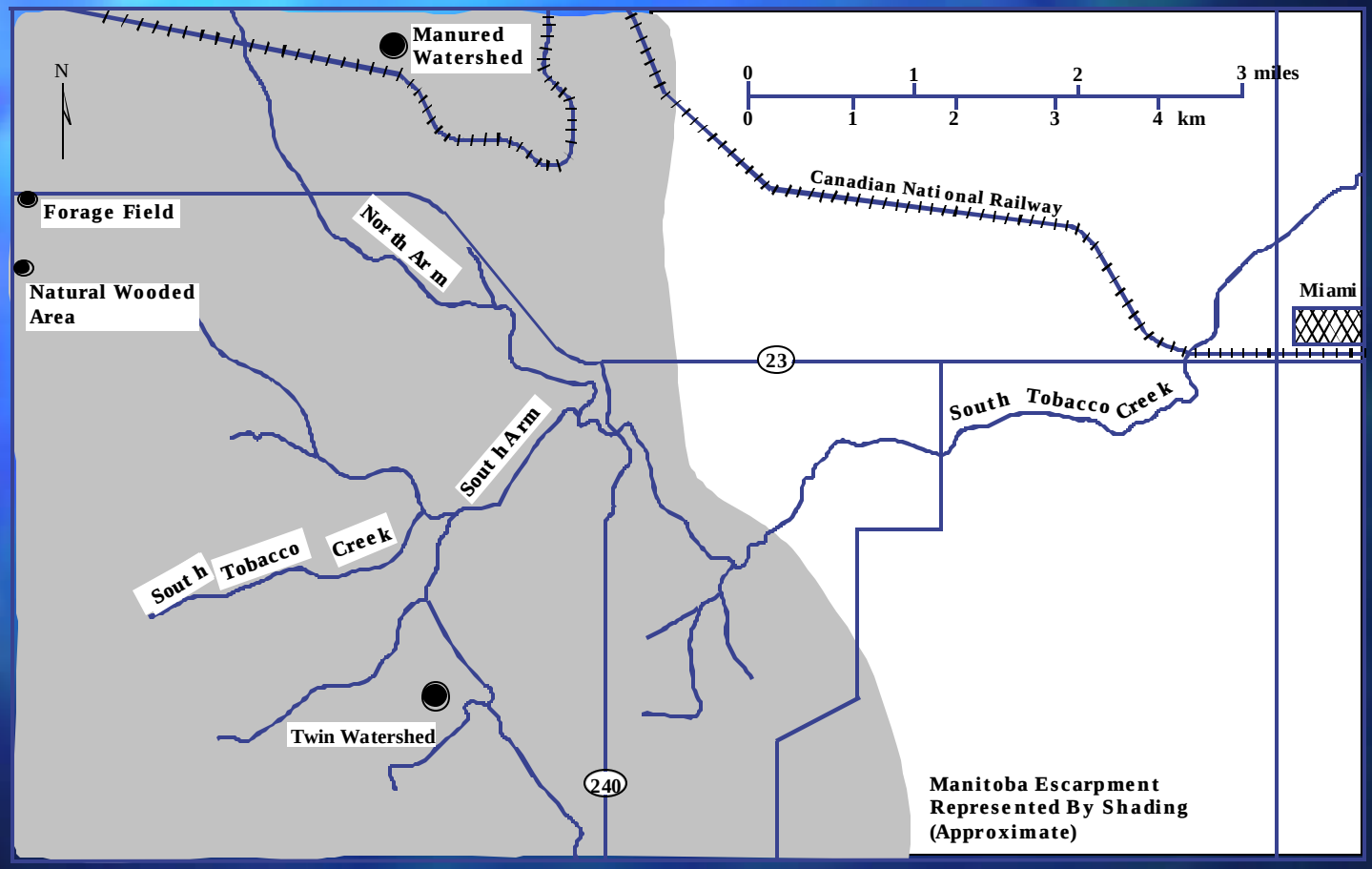
- *Concerns over expansion of hog industry and increased manure applications to land.*

- *To gain a better understanding of differences in quality of runoff water from land under different uses.*

Study Objectives

- To determine bacteria, nutrient, and suspended solid residues in spring runoff and rainfall event runoff leaving land surfaces.
- Gain information on the field scale.
- Follow methods commonly used by producers.
- Obtain background water quality runoff information from non-fertilized areas.

Study Locations Within The South Tobacco Creek Watershed



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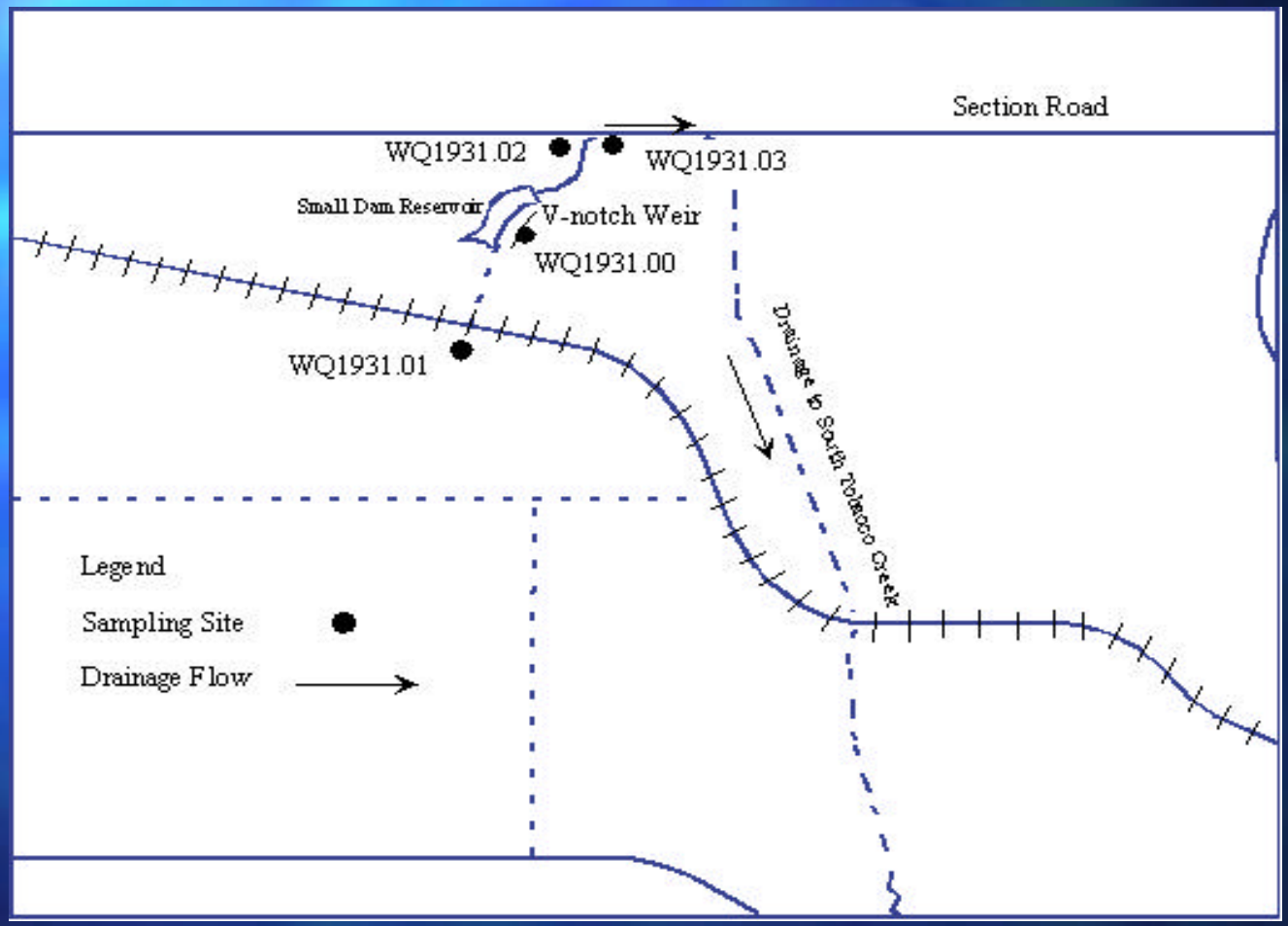
Sampling Sites In The Manured Watershed Study Area.



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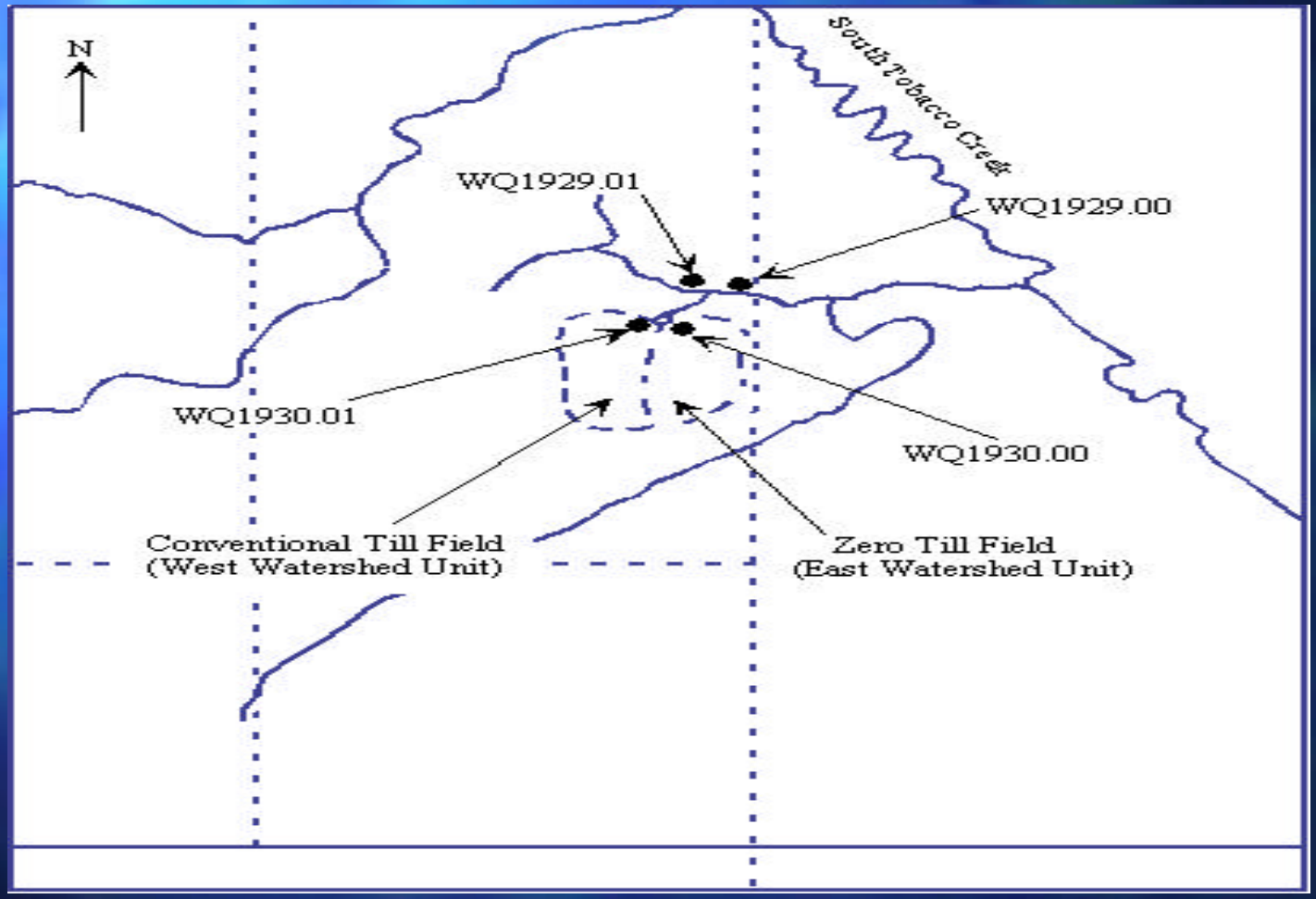
Sampling Sites In The Twin Watershed Study Area.



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Natural Wooded & Forage Field Sites

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Twin Watershed & Manuared Watershed Weir Setups

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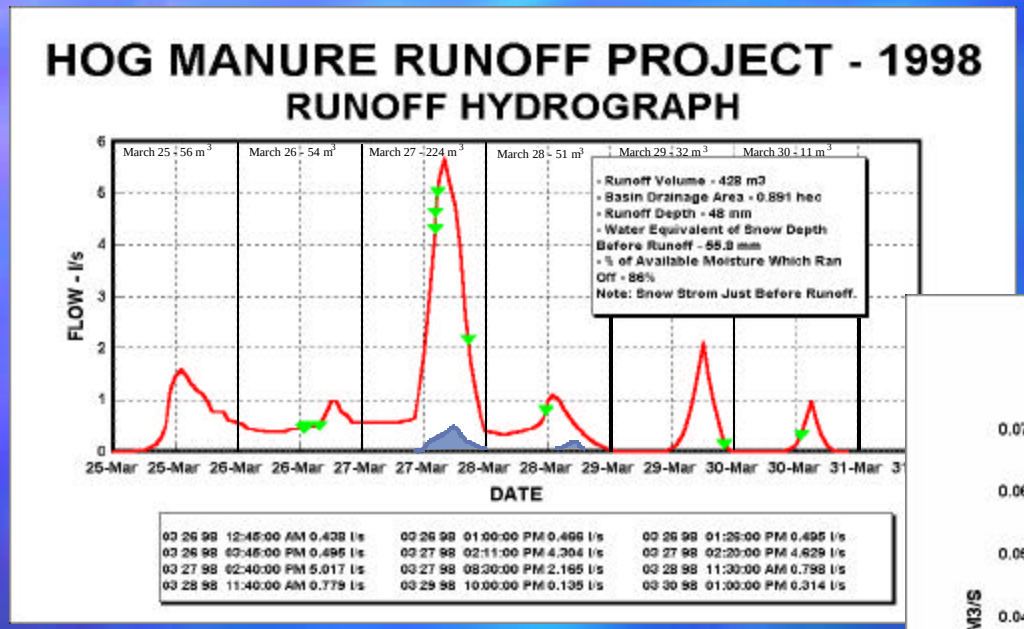
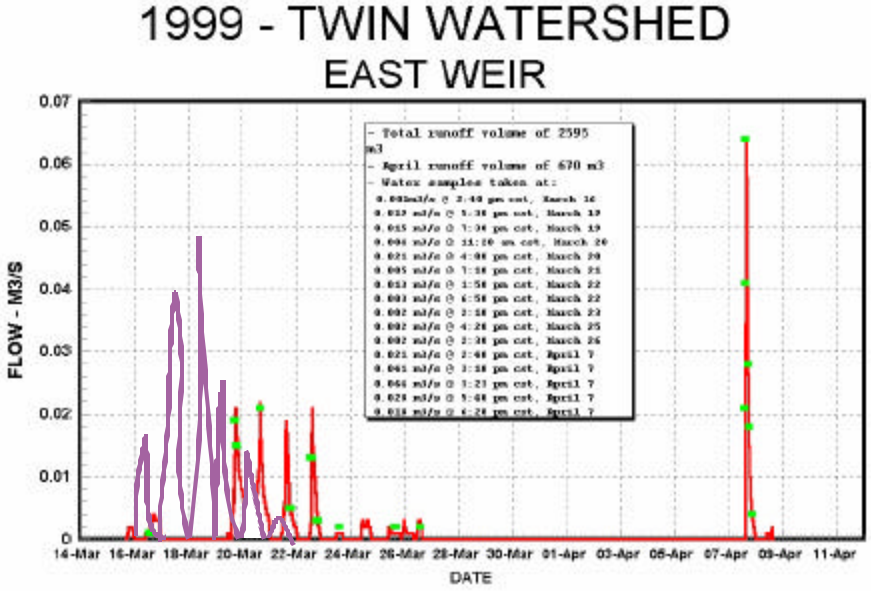
Hydrograph Examples





1998 Manured - 428 m^3
1999 - 8 m^3
2000 No runoff

1998 West - 3200m^3; East - 4397m^3;
1999 " - 750m^3; " - 2595m^3
2000 No runoff ; - 1873 m^3

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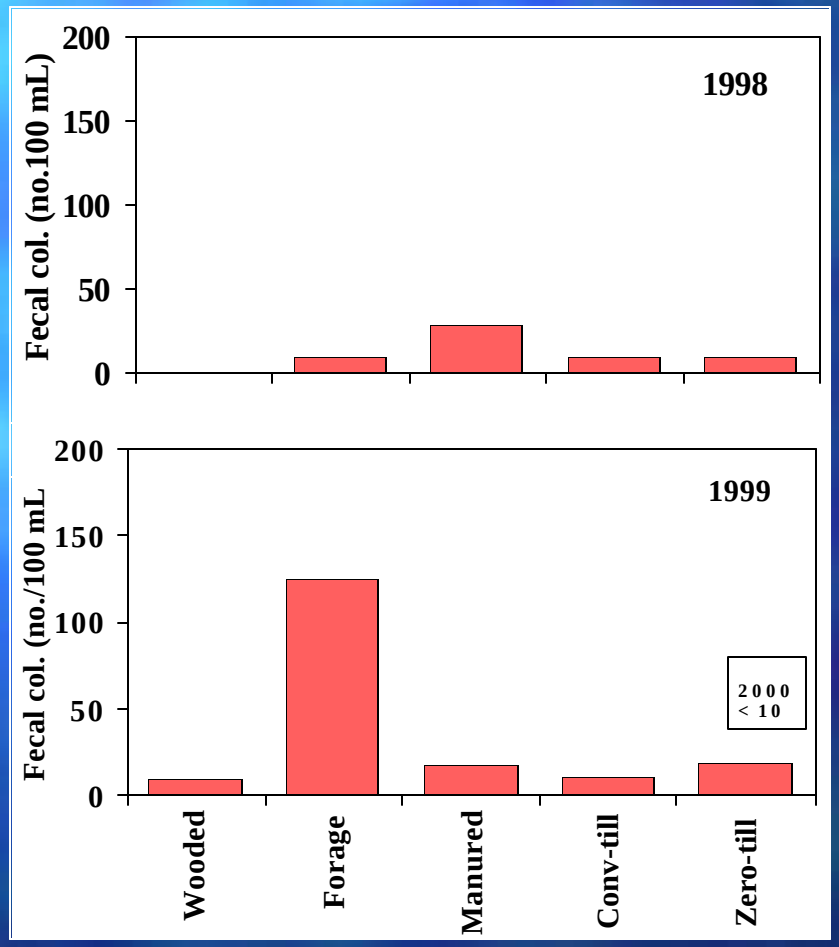
Fecal Coliform Counts



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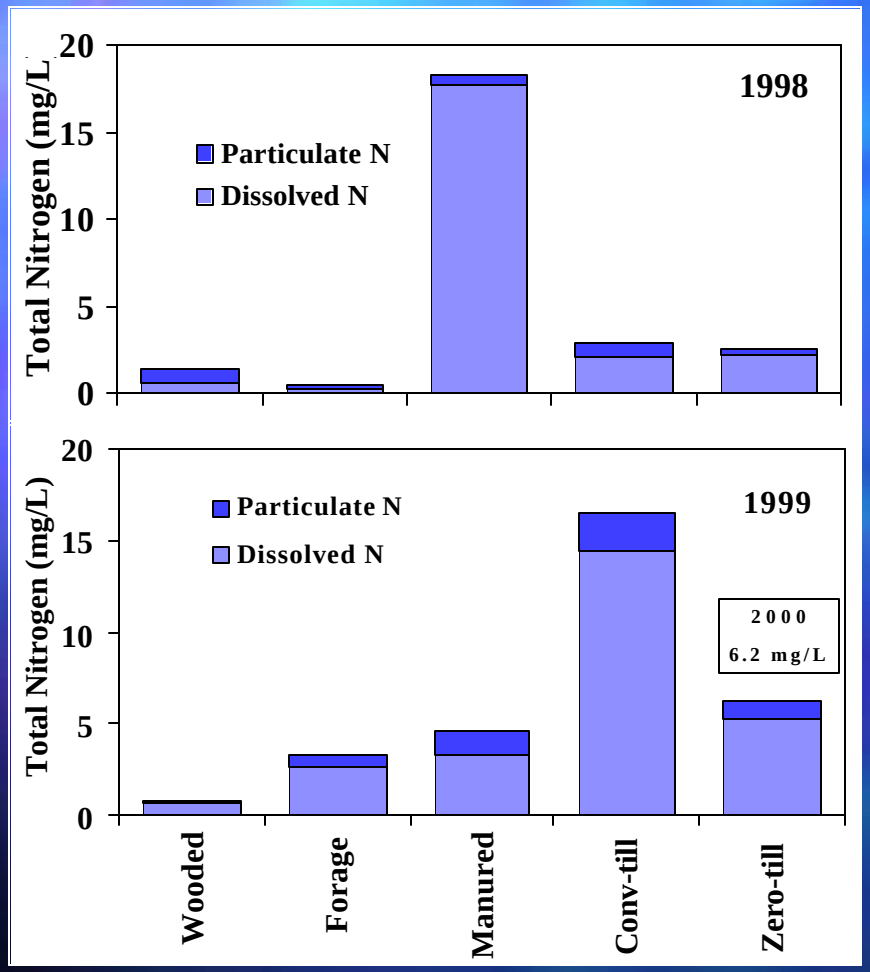
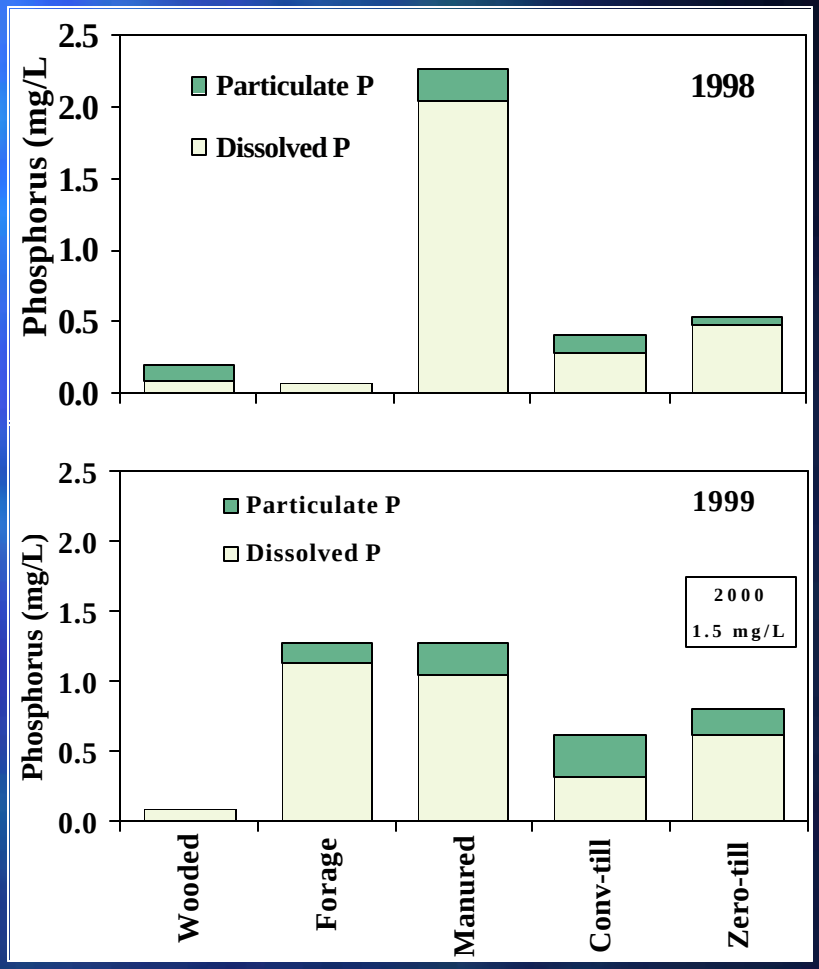
Nutrient Concentrations





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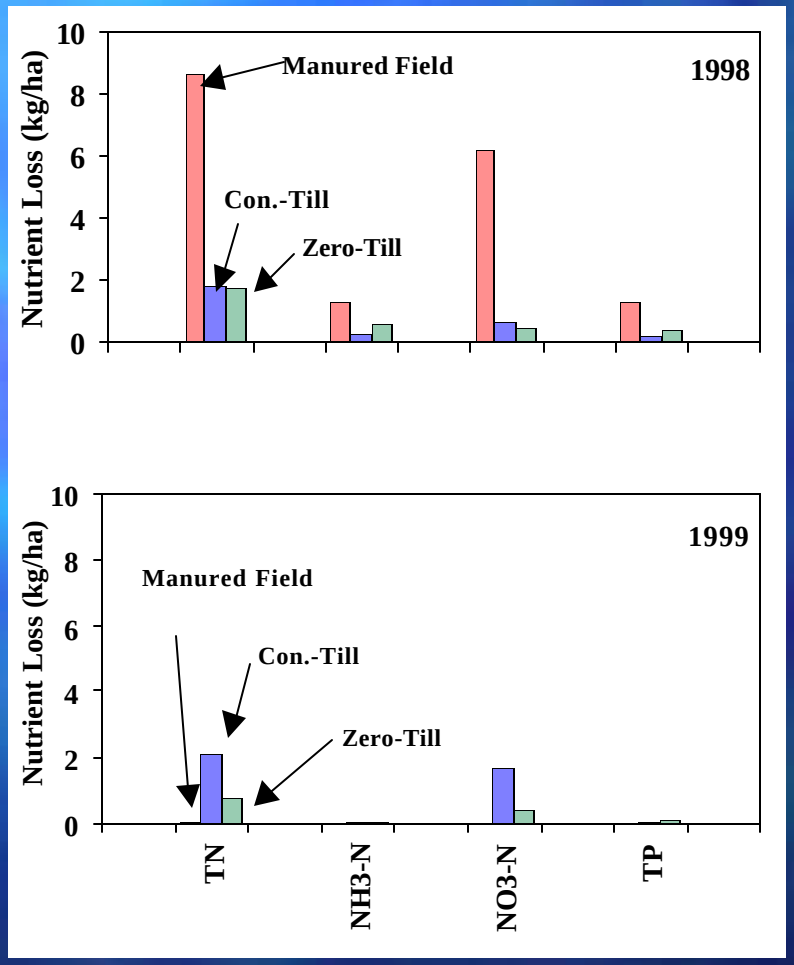
Nutrient Loading



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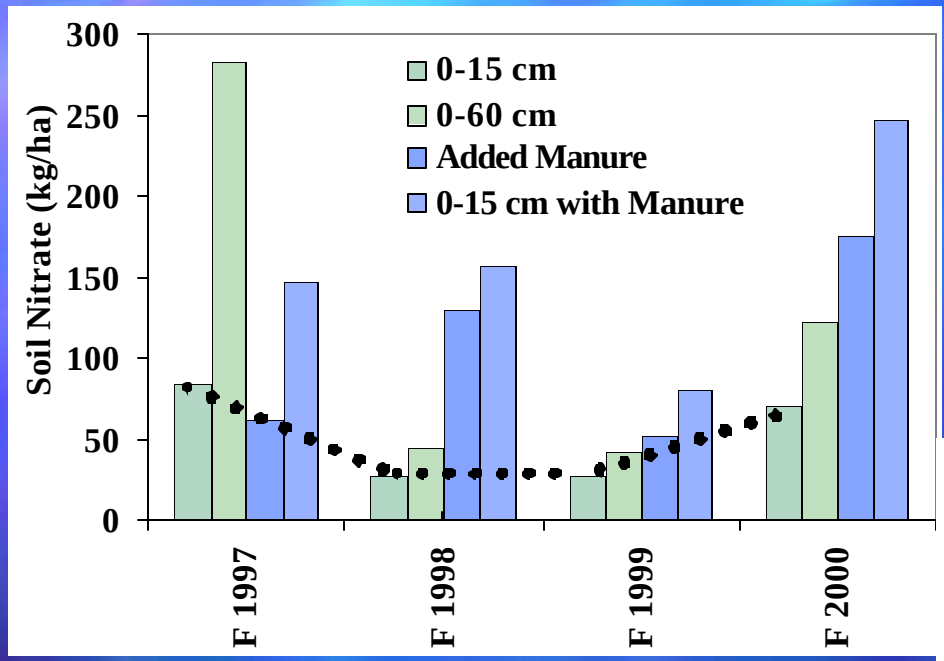
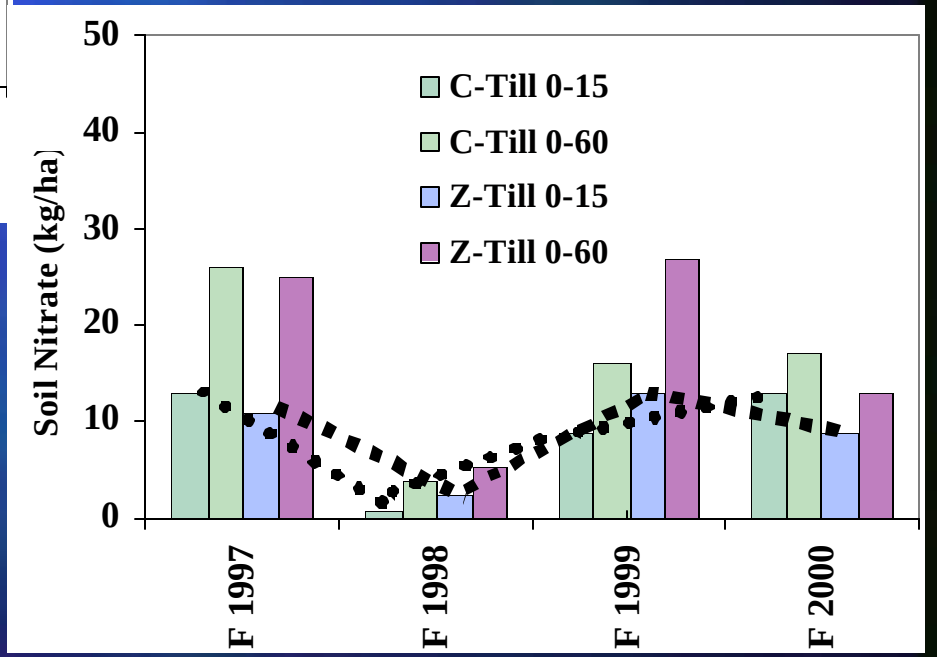
Precipitation Events

- Rainfall events in 1999 and 2000 large enough to produce measurable runoff.
  - Overall nutrient loads from rainfall events were usually lower due to fewer days of runoff
  - An exception occurred from Conventional-till field where the P load (0.436 kg) from the May 22, 1999 rainfall event was actually higher than whole spring runoff (0.318 kg).

Soil Nitrogen Values





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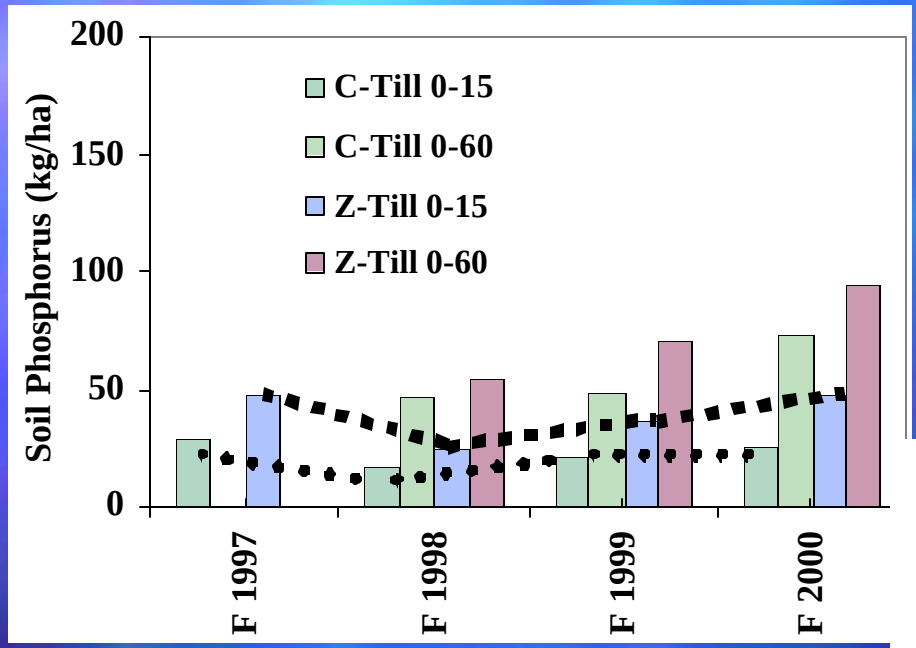
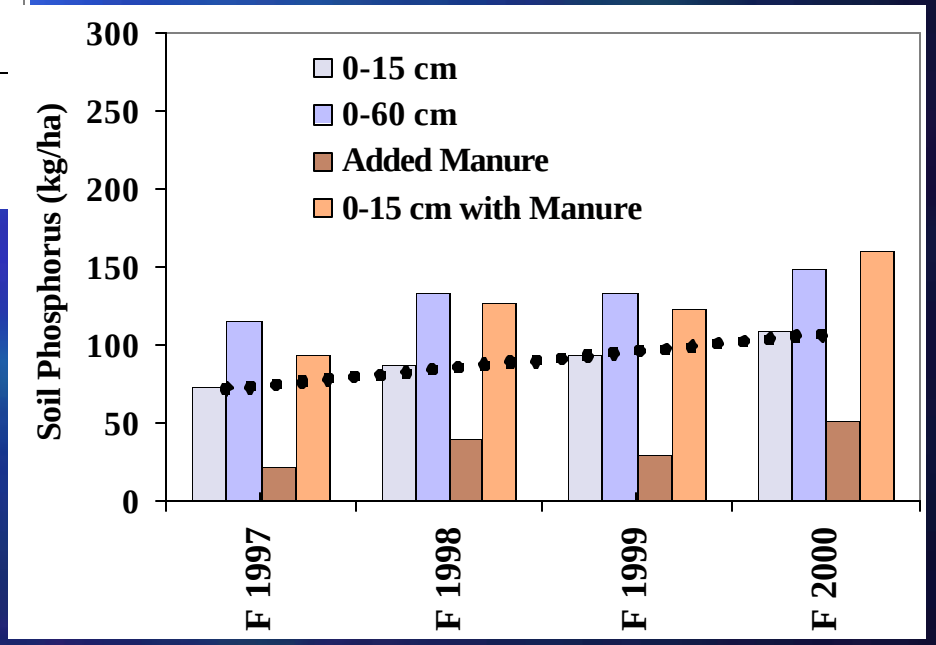
Soil Phosphorus Values





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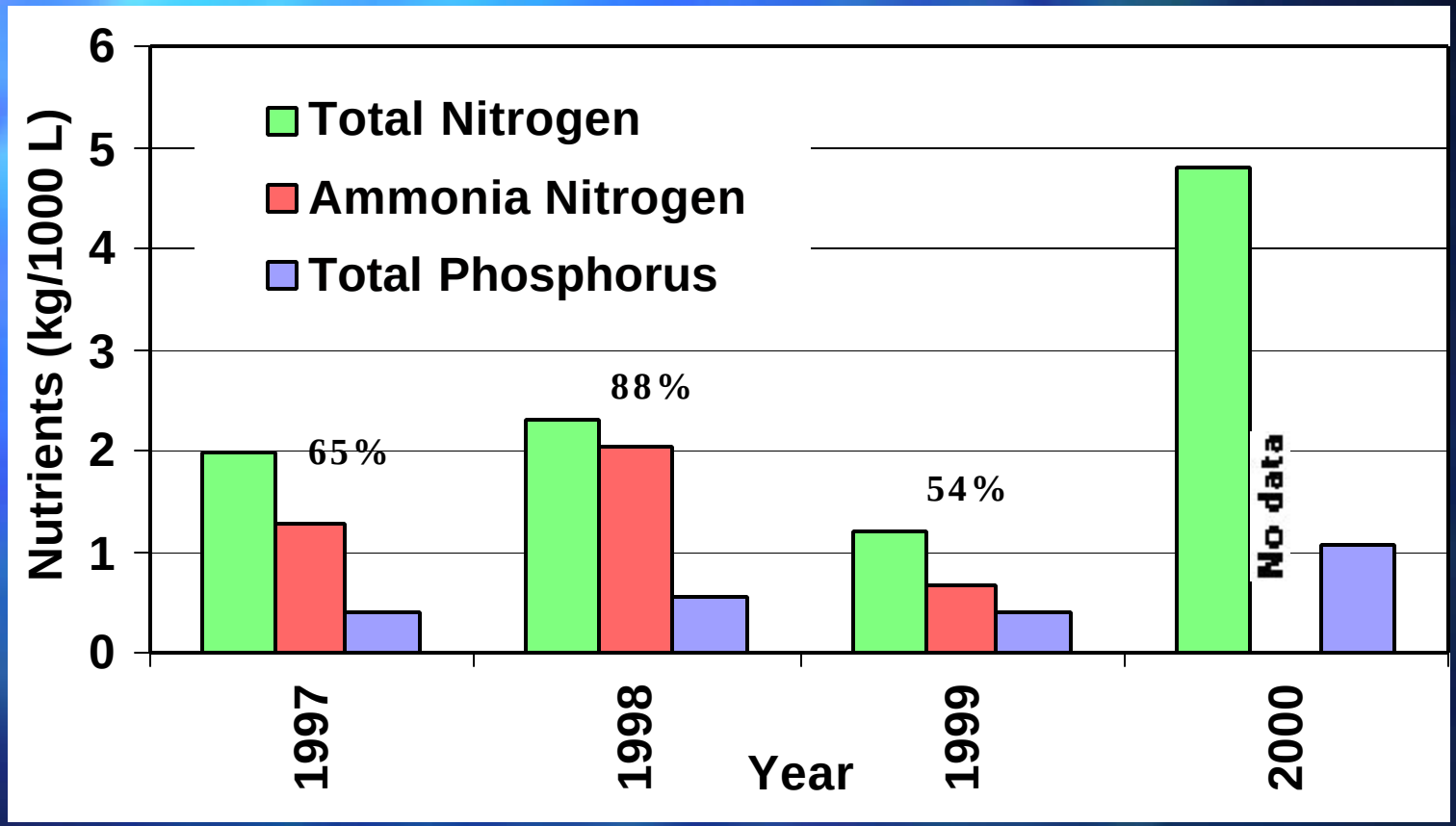
Manure Analyses



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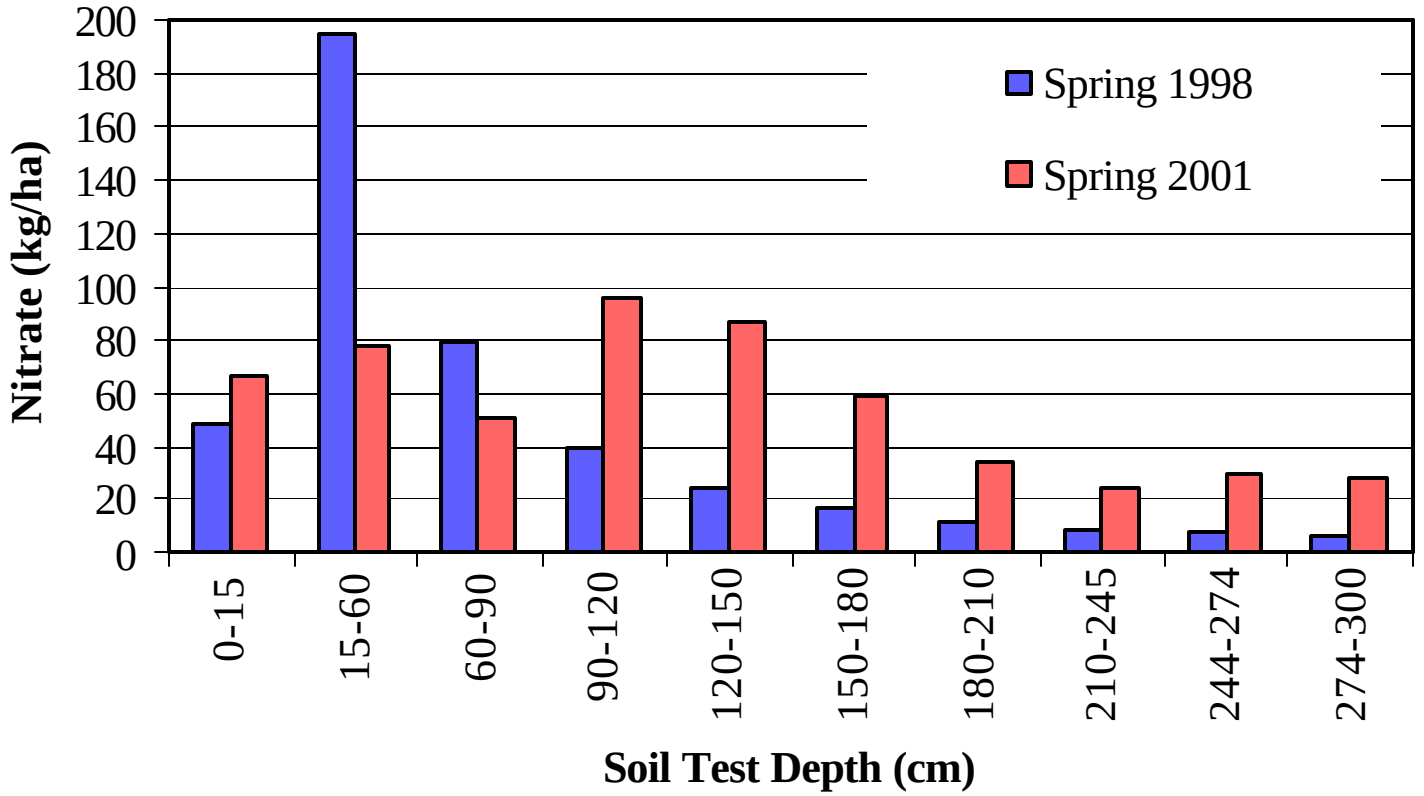
Deep Nitrate Testing



Summary

- *Fecal coliform contributions from fall application of hog manure not any greater concern than from non-manured areas.*
- *Greater nutrient losses are more apt to occur from application of manures and other fertilizers in fall than after spring runoff.*

Summary continued

- *It could not be determined if application rates based upon guidelines prevented excessive nutrient loss because fertilization rates and subsequent soil nitrate values were higher than desired.*
- *Runoff volumes from fields had an influence on nutrient concentrations and loss.*

Summary continued

- *Mean nitrogen and phosphorus concentrations from the natural wooded area were relatively low compared to other sites.*
- *Total nutrient loads leaving fields due to rainfall events were usually lower than during the spring runoff period.*

Summary continued

- *Consecutive annual applications of manure to the same field appeared to cause gradual accumulations of phosphorus in the top soil profile.*
- *Deep soil testing to ten feet on the manured field showed some downward migration of nitrate nitrogen had occurred between 1998 and 2001.*

Summary continued

- Soil testing and testing of hog manure prior to application recommended to prevent over application nutrients.
  - Management of hog manure as a fertilizer is more complex than inorganic fertilizers.

Consideration For Future Study

- ***Re-evaluate runoff loss from broadcast spreading in fall and keeping soil nitrate values within recommended guidelines.***

- ***Evaluate runoff losses from injection applications.***

Consideration For Future Study

- ***Soil tests in spring as well as fall to determine loss over and above measured runoff loss.***

- ***Capability to measure loading estimates from non-fertilized sites such as natural wooded area and grasslands.***

Questions ??