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Impact of Tillage Practices on Hydrology and Nutrients in Micro-Watershed in Manitoba

CWRA Conference

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Presentation Outline

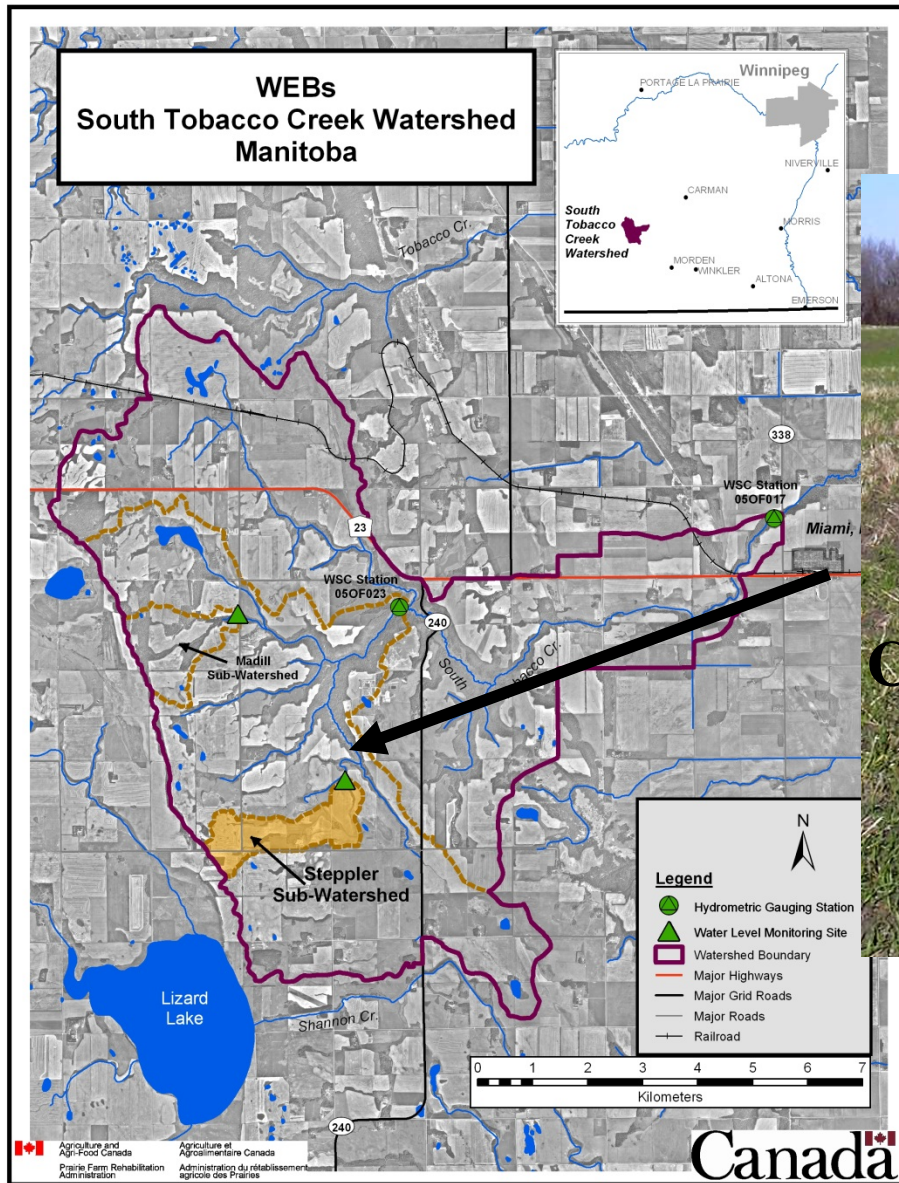
- **Project location**
- **WEBs – project description**
- **History of the tillage project**
- **Instrumentation**
- **Results**
- **Project team**



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Tillage Project



**Conventional
Tillage**

**Conservation
Tillage**

WEBs - Objectives:

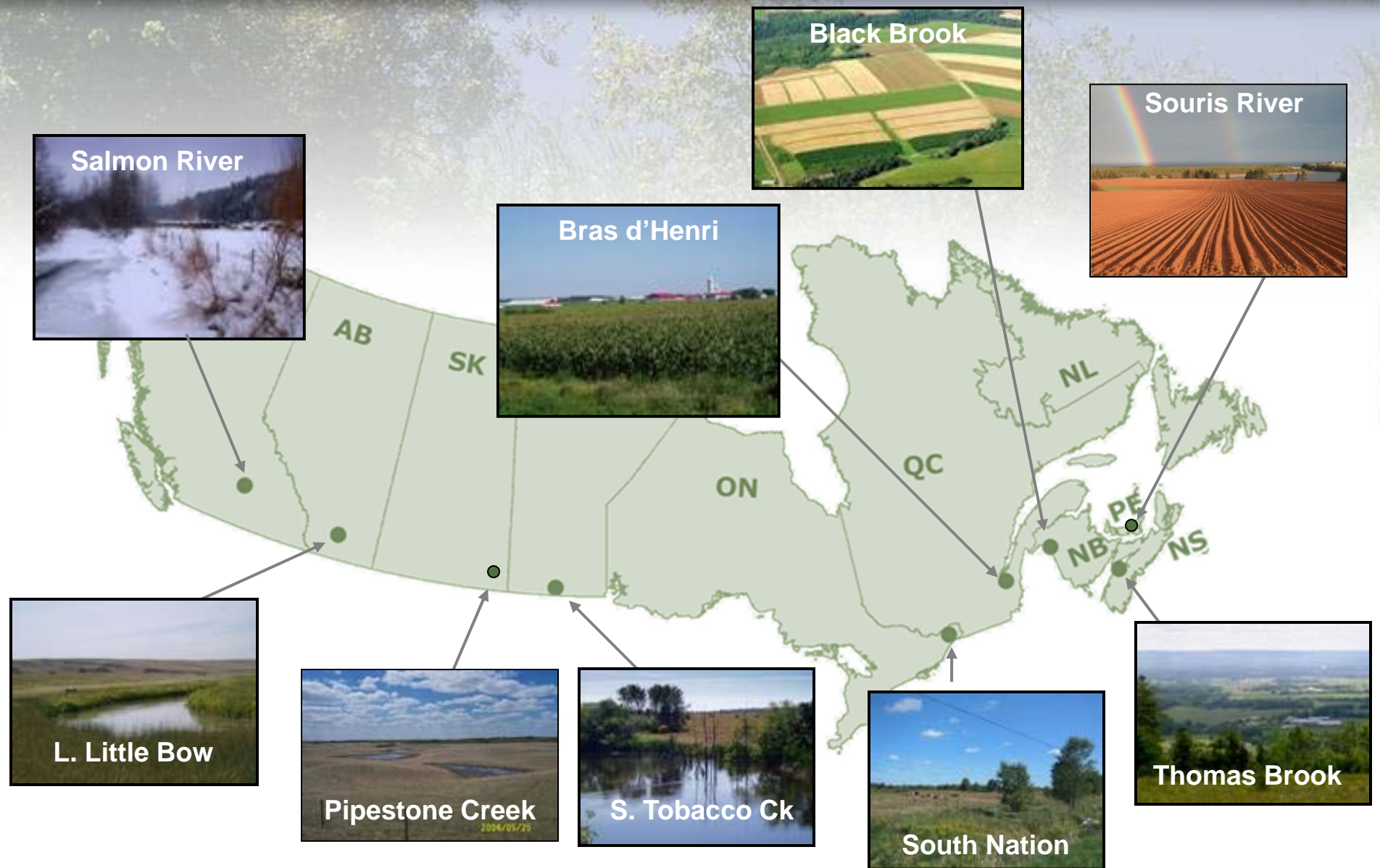
- Evaluate both the **environmental** and **economic** performance of BMPs
- To extend the analysis beyond the farm gate models are being used
- Water quality as a primary indicator



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9 Cross-Canada 'Living Laboratories'



WEBs - South Tobacco Creek Project

Five BMPs are Being Evaluated



**Holding Pond
Downstream of Cattle
Over-Winter-Feeding
Area**



Small Reservoirs



**Conservation Tillage
compared to Conventional
Tillage**

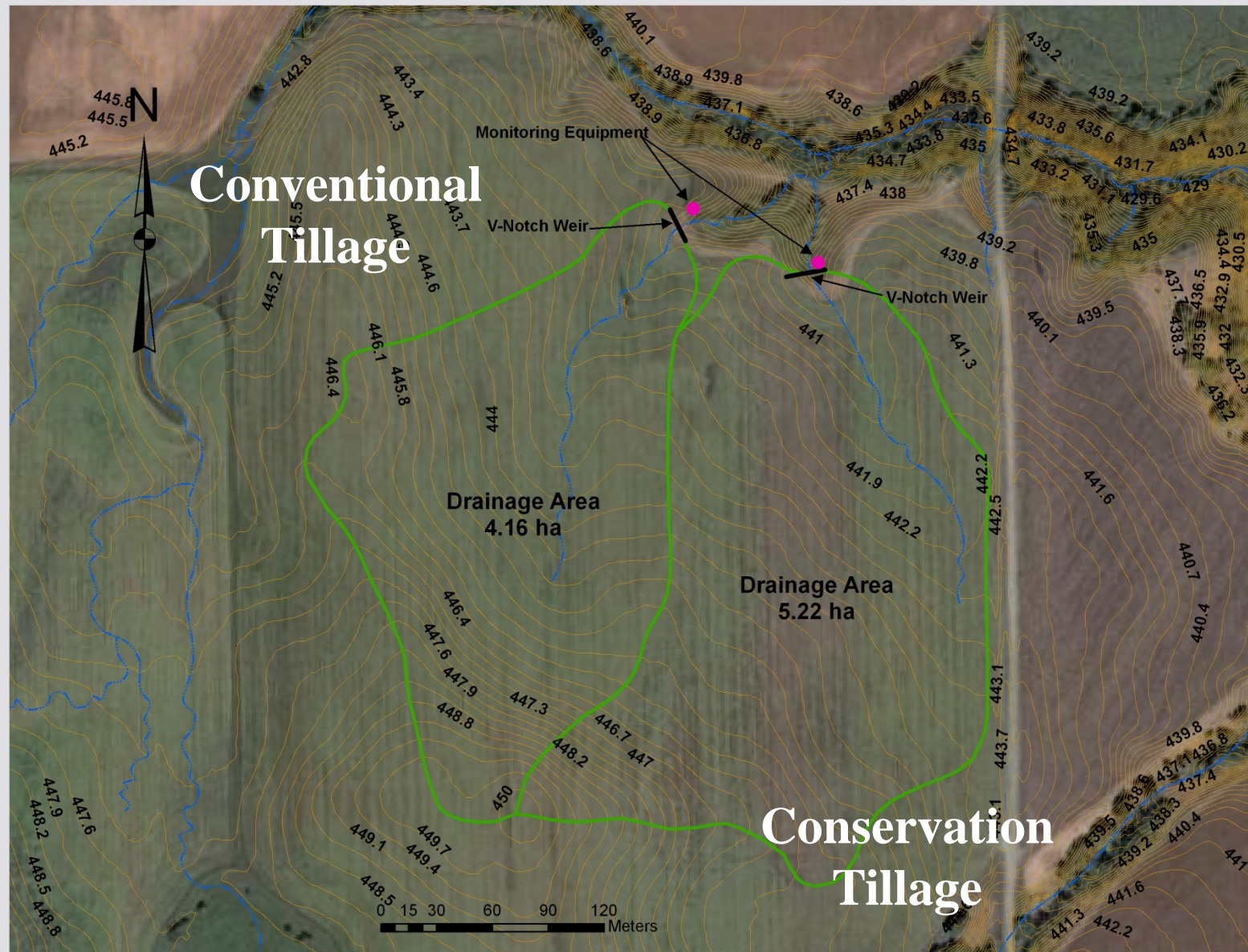


**Conversion of Crop
Land to Forage**



**Feeding cattle in the
field during the
winter months**

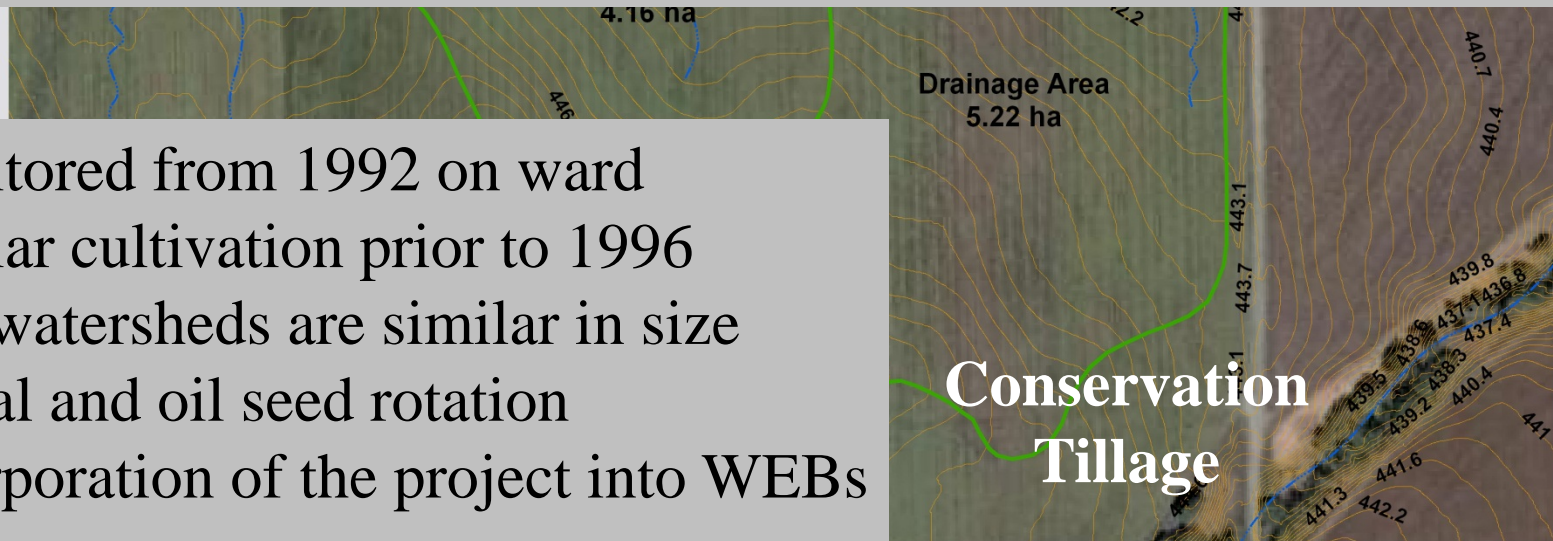
History of Tillage Project



History of Tillage Project

- Conventional tillage
 - Fall tillage (deep tiller)
 - Spring tillage with a lighter cultivator
 - harrowing
 - seeding
- Conservation tillage (zero tillage)
 - No fall tillage (occasional fall harrowing if heavy residue)
 - Direct seeding

- Monitored from 1992 on ward
- Similar cultivation prior to 1996
- Sub-watersheds are similar in size
- Cereal and oil seed rotation
- Incorporation of the project into WEBs



Runoff Monitoring & Water Sampling



Runoff Monitoring & Water Sampling



Runoff Monitoring & Water Sampling



Runoff Monitoring & Water Sampling

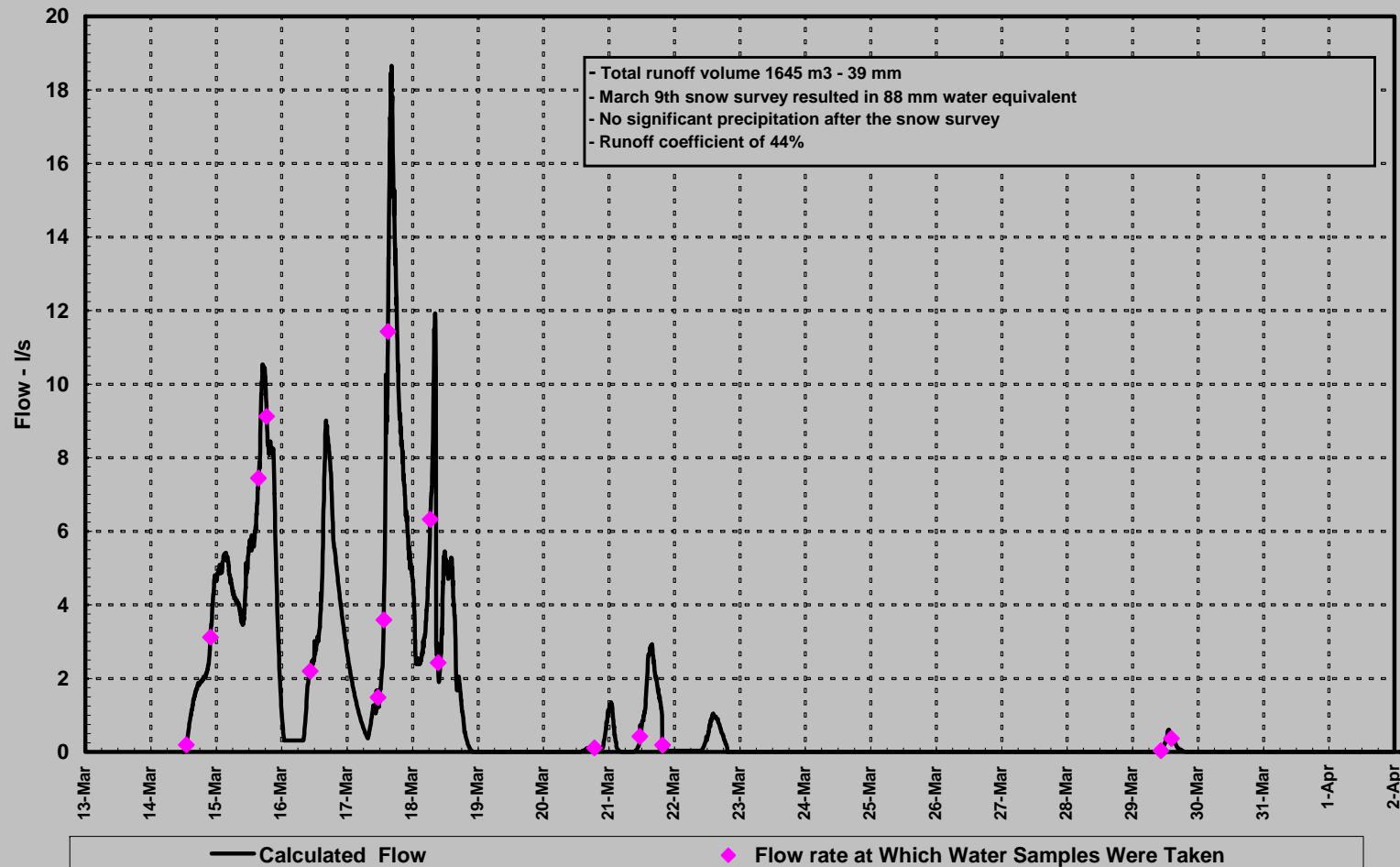


Runoff Monitoring & Water Sampling



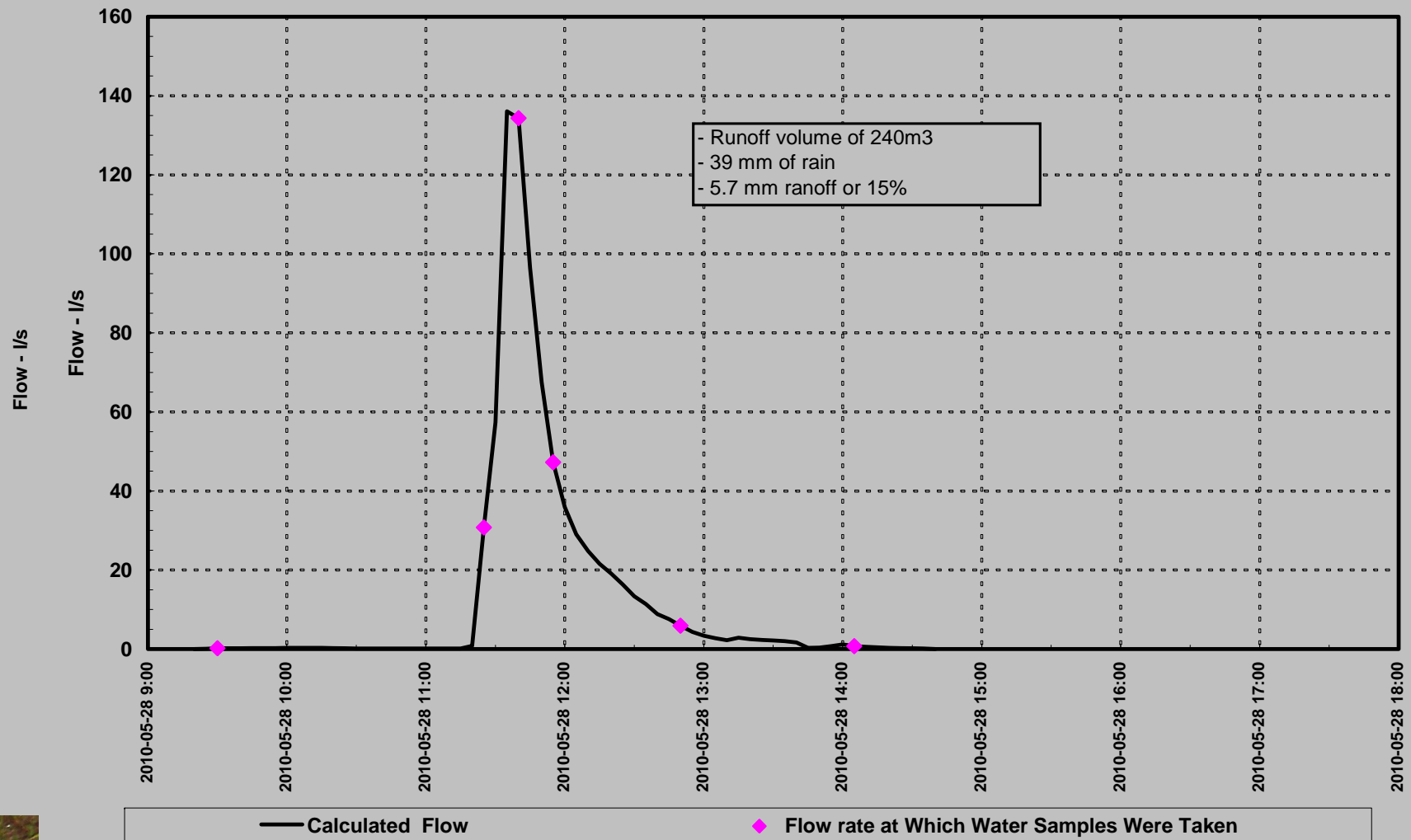
Runoff Monitoring & Water Sampling

Twin Watershed West - 2010



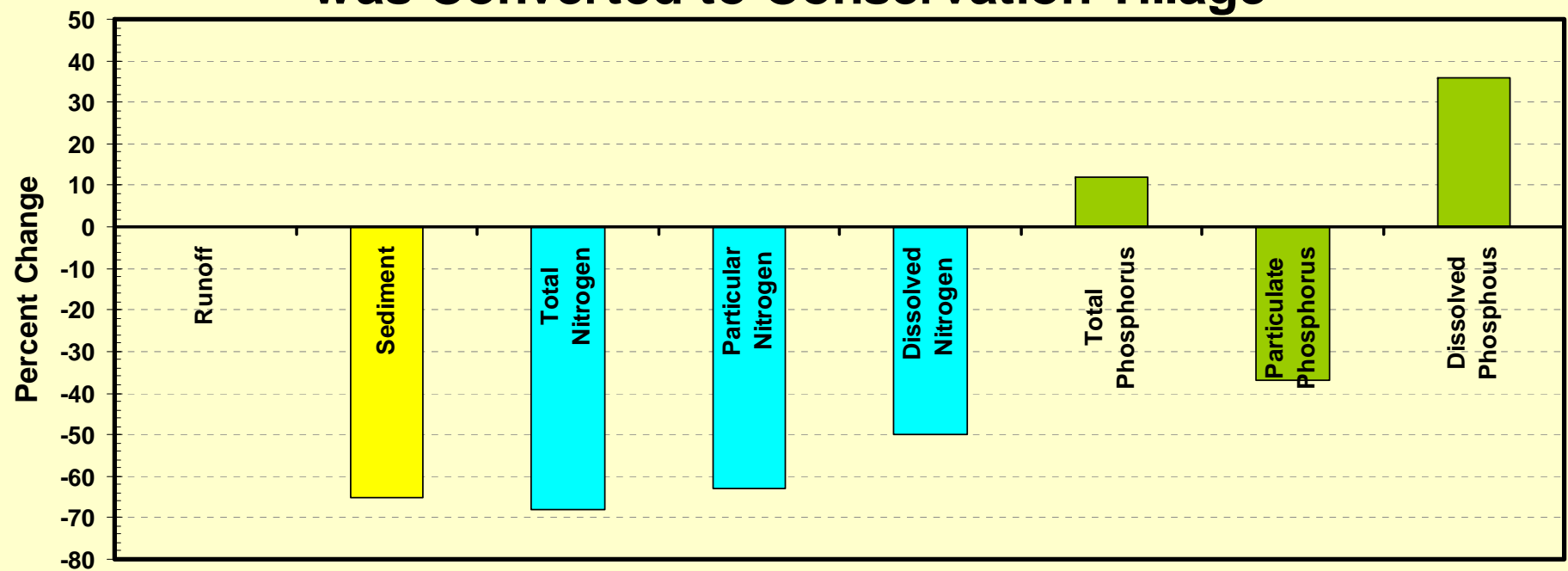
Runoff Monitoring & Water Sampling

Twin Watershed West - 2010



Changes in Export Under Conservation Tillage

Mean Annual Percent Change in Export when Field was Converted to Conservation Tillage



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Changes in Runoff Under Conservation Tillage

- No significant change in the mean annual runoff between conventional tillage and conservation tillage
- On a seasonal basis:
 - For snow melt the runoff was similar
 - For rainfall runoff the conservation tilled field did produce less runoff (after the transition period)
- The annual runoff is largely composed of snow melt runoff; > 80% of the annual runoff is snow melt runoff.



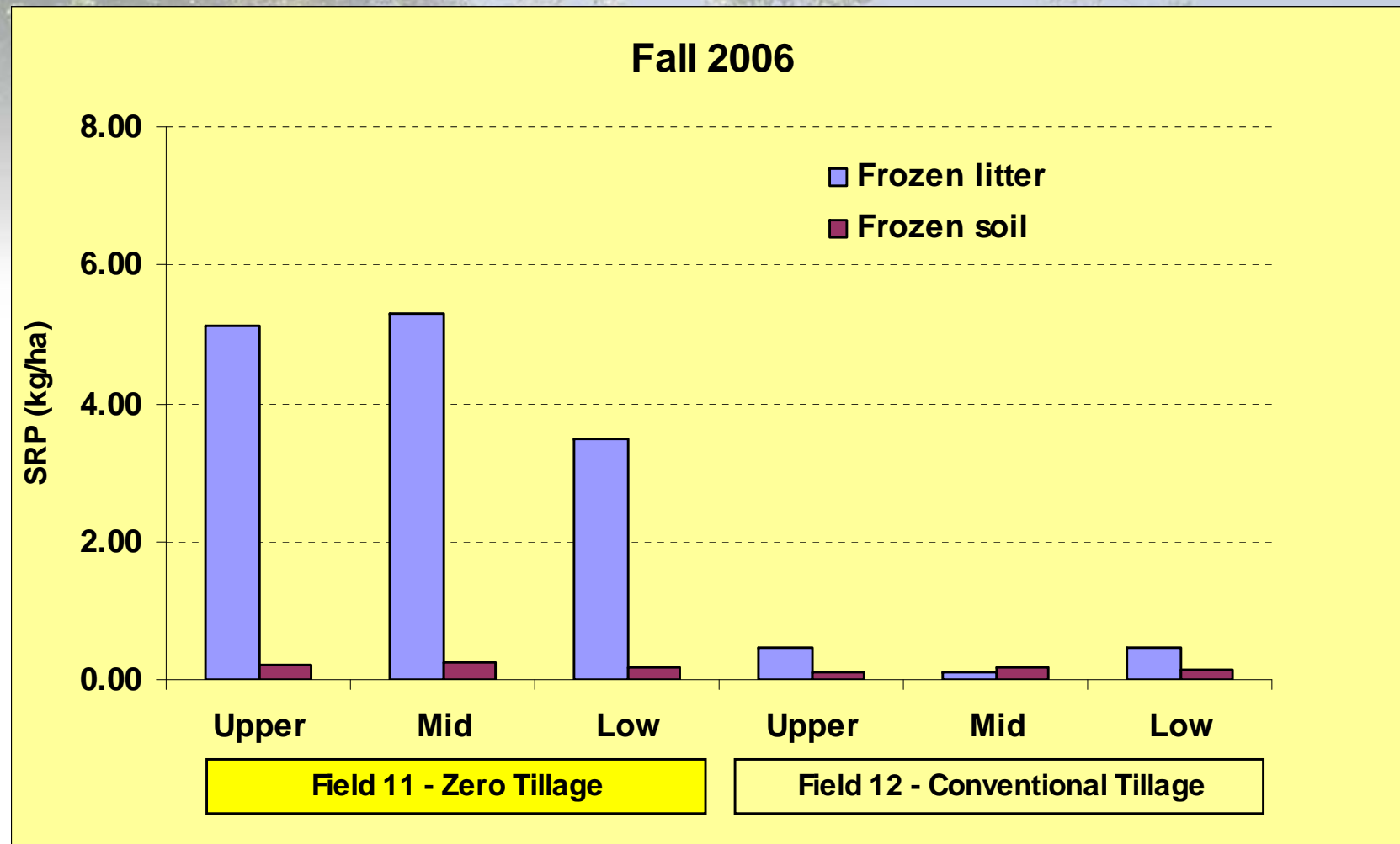
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Frozen and thawed vegetative residues may release large quantities of soluble reactive P, eg. zero till



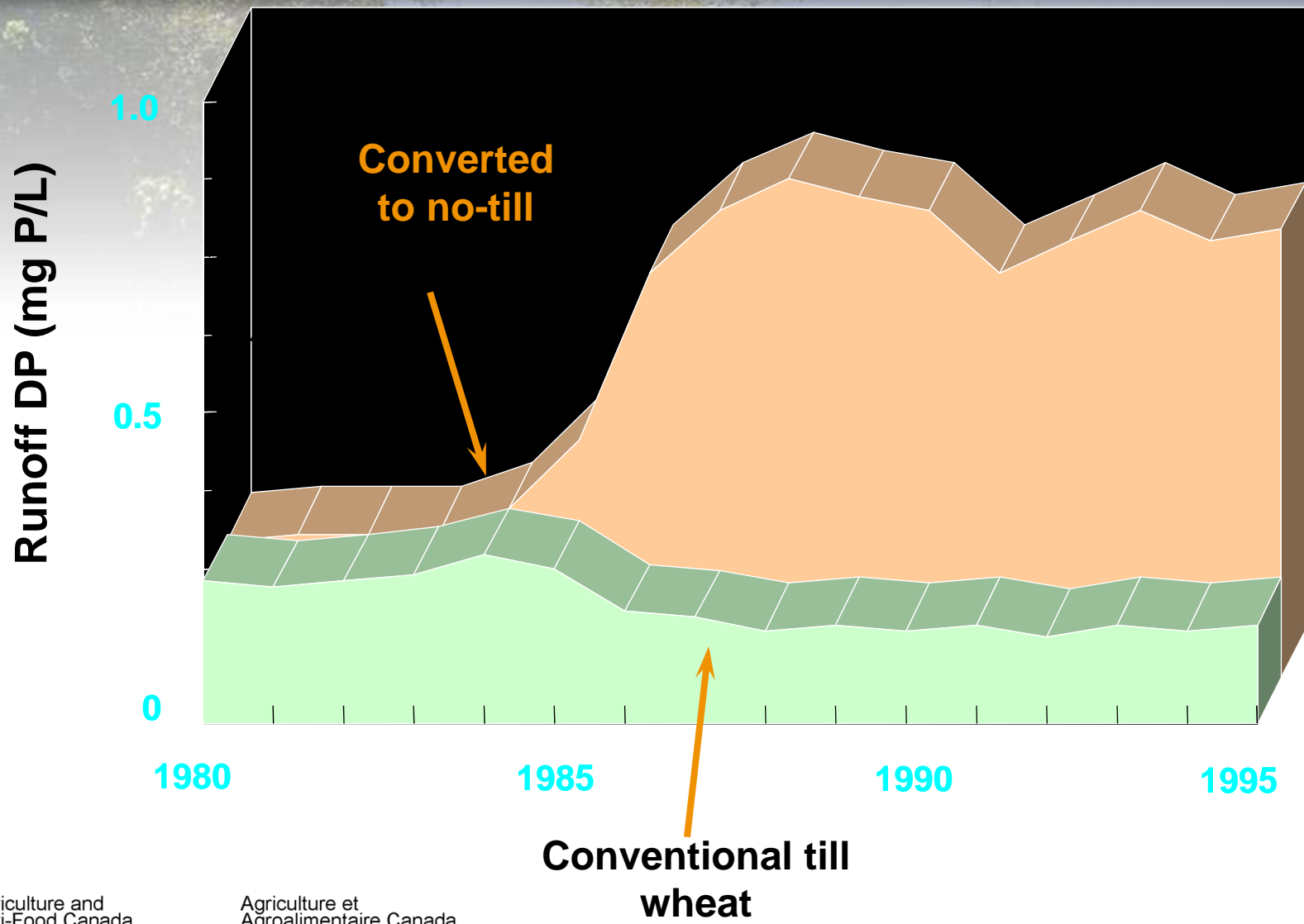
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Dissolved P Losses in No-Till in U.S.



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Sharpley and Smith 1994

Team

- **Producer**
- **Environment Canada**
- **Department of Fisheries and Oceans**
- **Deerwood Soil and Water Management Association**
- **University of Manitoba**
- **University of Guelph**
- **University of Alberta**
- **MAFRI (Funding)**
- **Manitoba Water Stewardship**
- **AAFC (Research Branch and AESB)**
- **Ducks Unlimited**



Thank You for listening



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