# Improved Flow Measurement for Drainage Water Management in Indiana

### **Drainage Water Management**

Drainage water management is the practice of raising the water table during the growing season and fallow season, while still being able to take advantage of drainage to improve trafficability and crop yield. By managing water as needed for accessibility and crop growth, producers can better adapt to climate change.



raised after harvest to reduce nitrate delivery.



The outlet is lowered a few weeks before planting and harvest to allow field to drain.



The outlet is raised after planting to potentially store water for crops.

# **Project Goals**

- Determine the impact of drainage water management on drain flow and nitrate load
- Assess the long-term effects of drainage water management on corn production

#### Site History

- Davis Purdue Agricultural Center (DPAC) in east central Indiana
- 40 acres in 4 quadrants to create a paired, replicated study site
- Drainage system and monitoring system for drain flow and nitrate was installed in 2005





Kyle Brooks<sup>1</sup>, Laura Bowling<sup>2</sup>, Jane Frankenberger<sup>1</sup>, Eileen Kladivko<sup>2</sup> <sup>1</sup>Dept. of Agricultural & Biological Engineering, <sup>2</sup>Dept. of Agronomy, Purdue University, West Lafayette, IN

# **Drain Flow Monitoring System**

- Electromagnetic flow meter : Krohne Waterflux 3000 - Advantages are the accuracy at low flow rates due to rectangular cross section as well as little maintenance due to no moving parts
- Signal converter sends pulse signals to Campbell data logger
- Communicates with the internet using a cellular modem
- Circular flume continues to be used as a back up; the ISCO is still used for composite nitrate samples



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**Krohne Signal Converter** 

# Testing

Designed and constructed an apparatus to test and calibrate the flow meters.



**Krohne Flow Meter** 

Water Flow

# Challenges

- Backflow conditions continue to create challenges in understanding flow.
- Our previous monitoring has shown that there are frequent high pressure conditions due to either a submerged outlet or saturated field conditions that makes it hard to use stage measurements alone to calculate flow.

# **Preliminary Data**

System installed and started operation on October 21, 2011





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