

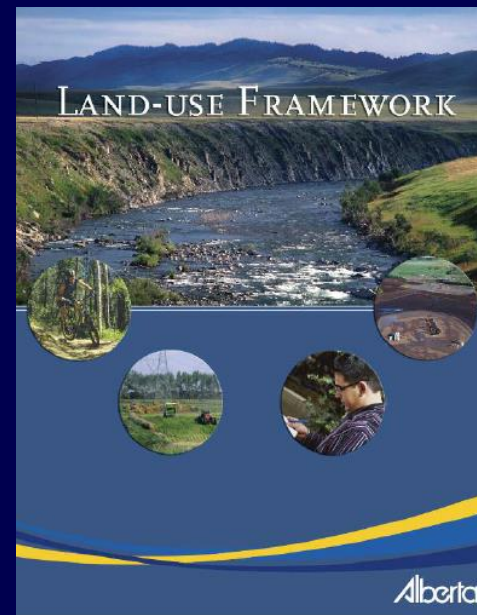
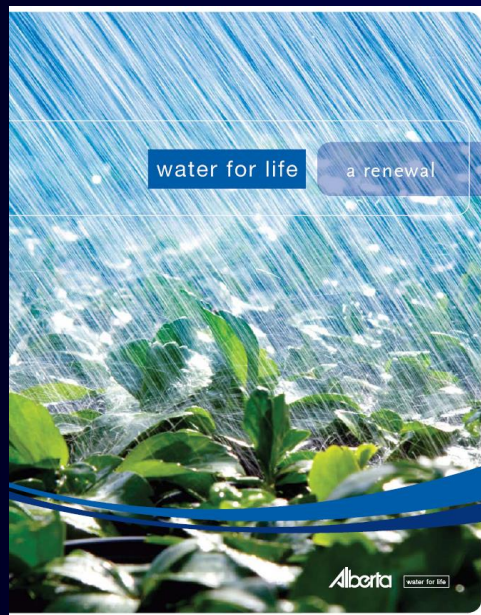
Alberta Phosphorus Watershed Project

Manure Management Update
Janna Casson M.Sc., P.Ag.
Lethbridge, AB
January 19, 2015



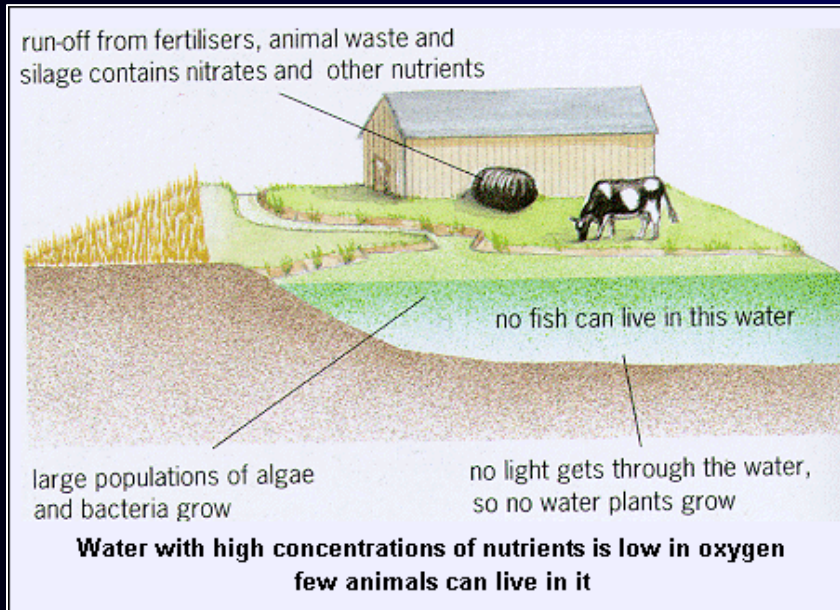
Linking Land and Water

- **Water quality is a major focus for cumulative effects management and natural resource planning in AB.**
- **Water quality outcomes have been developed for most of Alberta's rivers on the main stem.**
- **Agriculture will be expected to contribute towards maintaining (or obtaining) water quality.**



Agricultural Runoff & the Environment

- **Alberta's increasingly urban public perceives agriculture as a major cause of environmental degradation.**
 - **Overland runoff is one of the main ways agricultural nutrients enter waterways.**
 - **Too many nutrients can lead to algae blooms, odours, fish die-offs, and animal health safety concerns.**



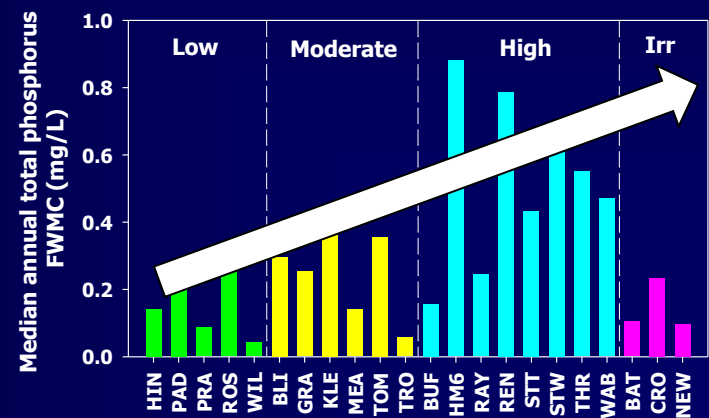
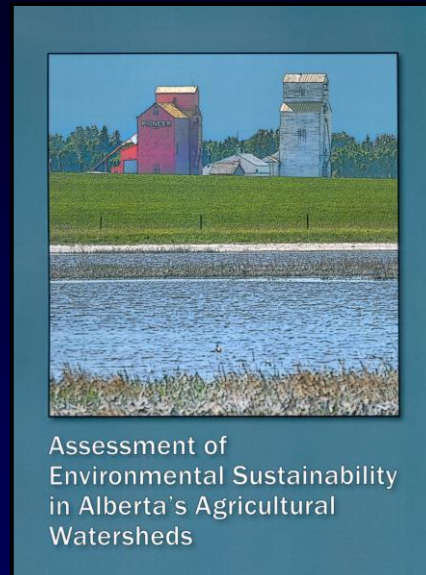
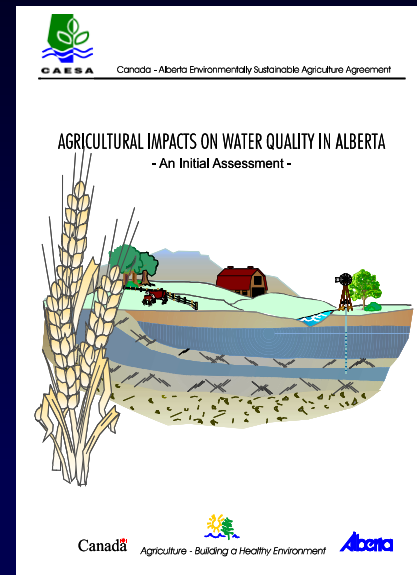
How Do Nutrients Enter Water Bodies?

- **Landscape Factors** (slope, soil nutrient retention, land cover)
- **Environmental Factors** (rain and snowmelt)
- **Management Factors** (frequency & rate of manure and fertilizers, livestock access to stream, location of seasonal bedding and feeding areas)



Alberta Environmentally Sustainable Agriculture (CAESA & AESA)

- CAESA (1992-1997), AESA (1999-2007)
- Agricultural practices **are contributing** to the degradation of water quality.
- As agricultural intensity increases, water quality deteriorates.
- Nutrient concentrations exceed guidelines, even when ag development is minimal.

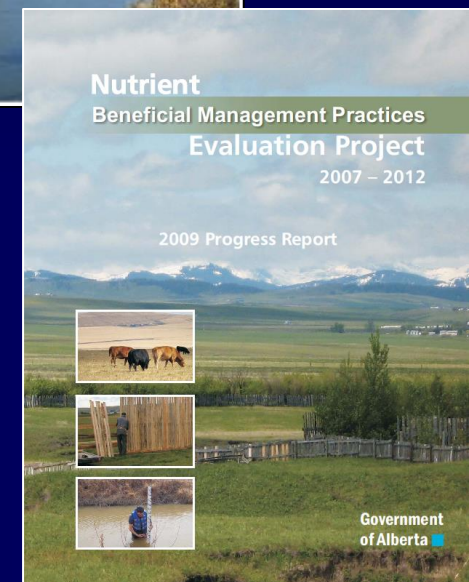
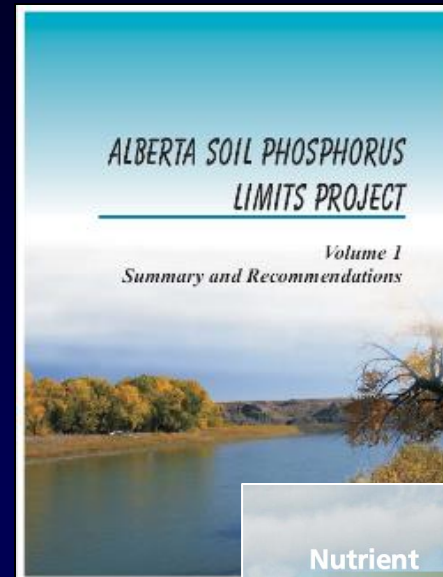


Lorenz et al. 2008

Watershed (1999 to 2006)

Alberta Soil Phosphorus Limits and Nutrient BMP Evaluation Projects

- **P Limits (1996-2006):**
Legislated soil P limits should not be implemented as BMPs need to be developed, tested, & demonstrated in AB.
- **BMP Study (2007-2012):**
Developed a watershed approach to BMP implementations & determined environmental & economic costs/benefits.





Alberta Phosphorus Watershed Project

Purpose and Objectives:

“To improve water quality at a sub-watershed scale through producer’s adoption of a comprehensive phosphorus management tool”

- **Develop an Alberta Phosphorus Management Tool (APMT) to improve P management at the farm-scale.**
- **Implement as many BMPs as possible in 2 watersheds utilizing the tool (focus on critical source areas).**
- **Evaluate the cumulative effects of the BMPs on reducing P loss from the watersheds.**
- **Evaluate the economic costs and social benefits of implementing the recommend BMPs.**

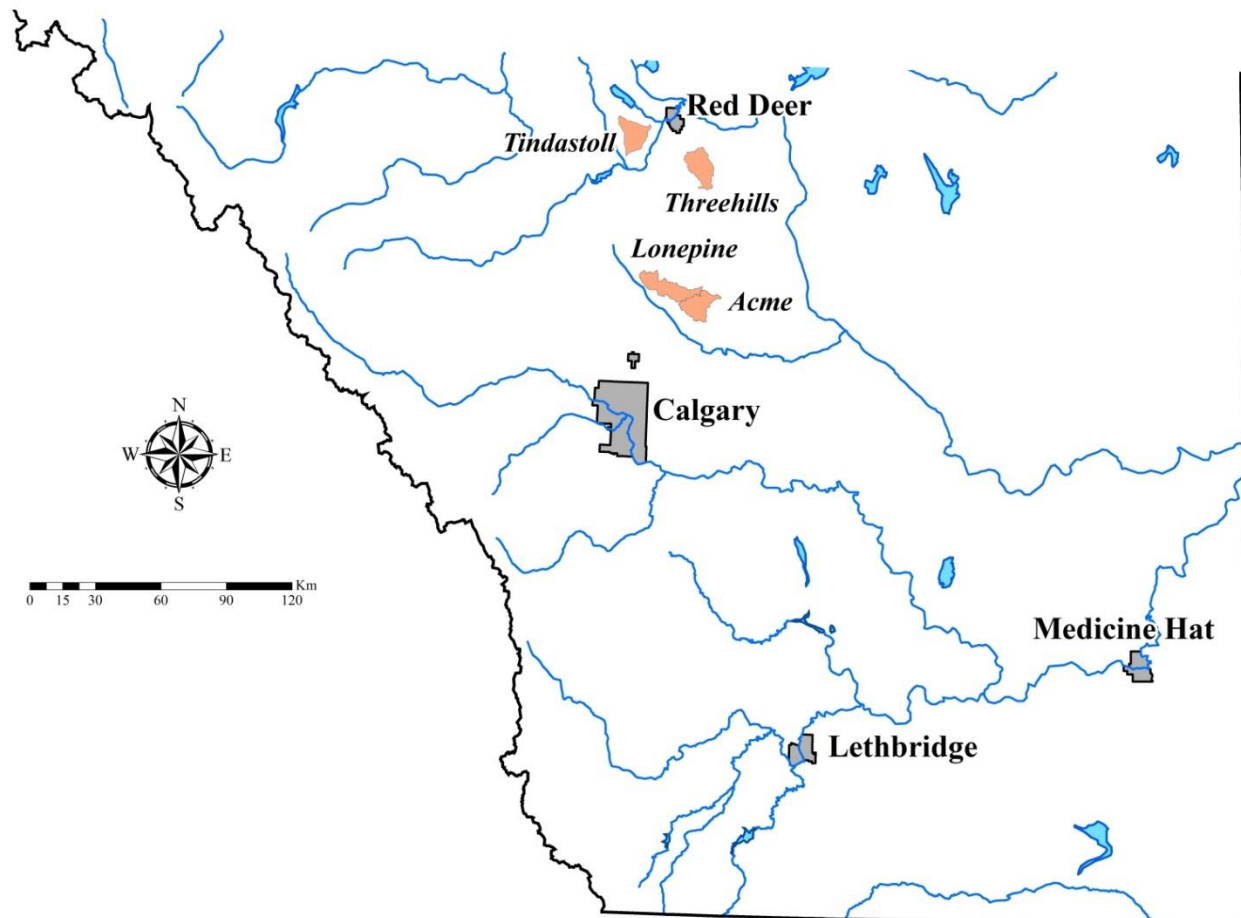
Alberta Phosphorus Watershed Project

Partners:

- **Landowners in the watersheds**
- **Intensive Livestock Working Group**
- **Alberta Agriculture and Rural Development**
- **Alberta Livestock and Meat Agency**
- **Red Deer County**
- **Kneehill County**
- **Mountain View County**

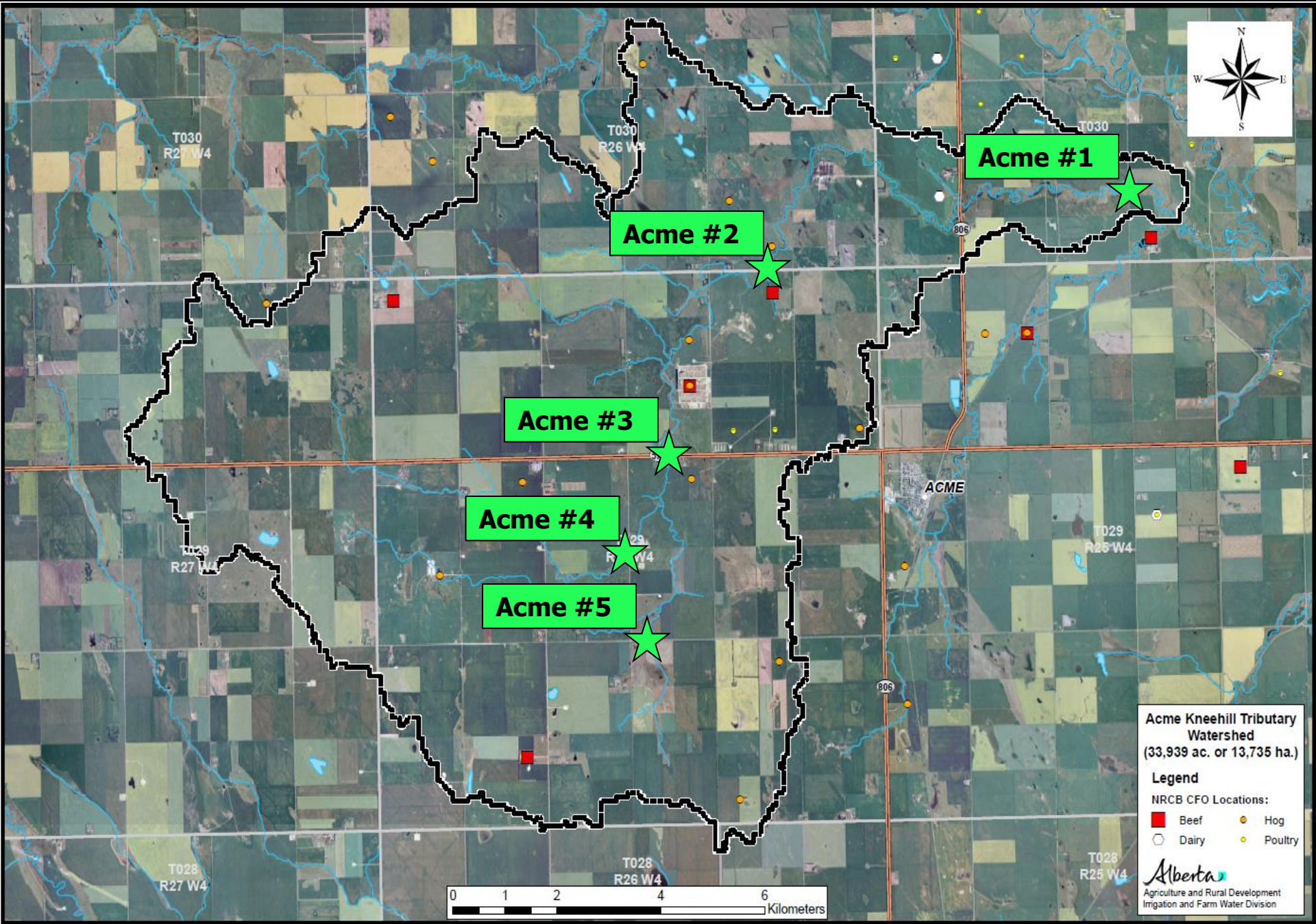


Watershed Locations



Treatment watersheds: Tindastoll & Acme Creeks (2013&2014)
Control watersheds: Threehills & Lonepine Creeks (2014)

Acme Creek Watershed



Acme #1

Acme #2

Acme #3

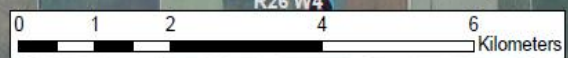
Acme #4

Acme #5

Acme Kneehill Tributary Watershed
(33,939 ac. or 13,735 ha.)

Legend

- NRCB CFO Locations:
- Beef (Red square)
 - Dairy (White circle)
 - Hog (Orange circle)
 - Poultry (Yellow circle)



Acme Creek Land Cover

- **Foothills Fescue Grassland Natural subregion**
- **Primary land use is cereal cropping**
- **Hay and pasture land**
- **Beef feedlots, dairy, hog (1 active) and poultry operations**
- **Some wetlands and intact riparian areas**



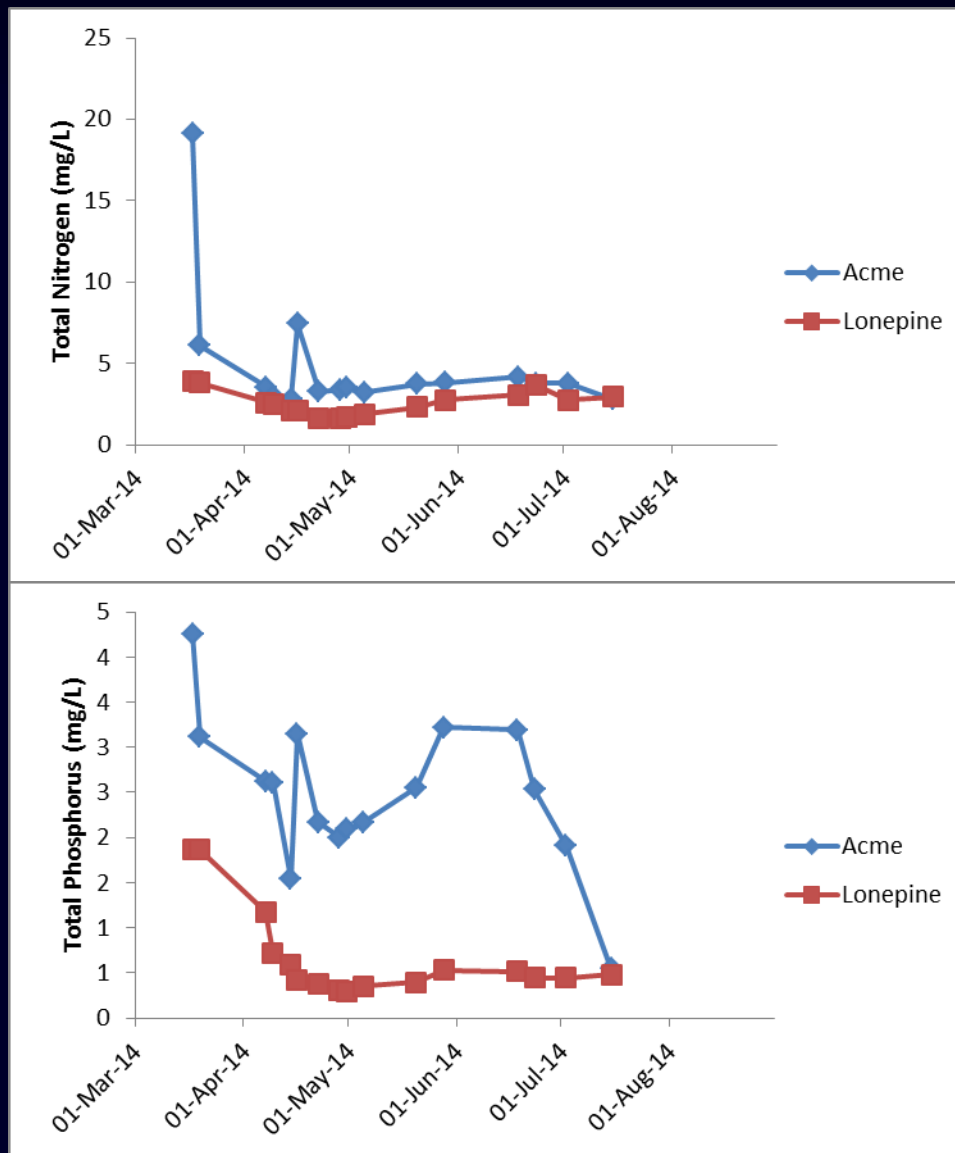
Acme and Lonepine flows



- **Acme and Lonepine tributaries enter Kneehill Creek and then flows into Red Deer River west of Drumheller**
- **Flow slowed down after snowmelt and started again with heavy rains in spring**
- **Flow measurement at both outlets using Agronauts**



Outlet Nutrient Trends 2014

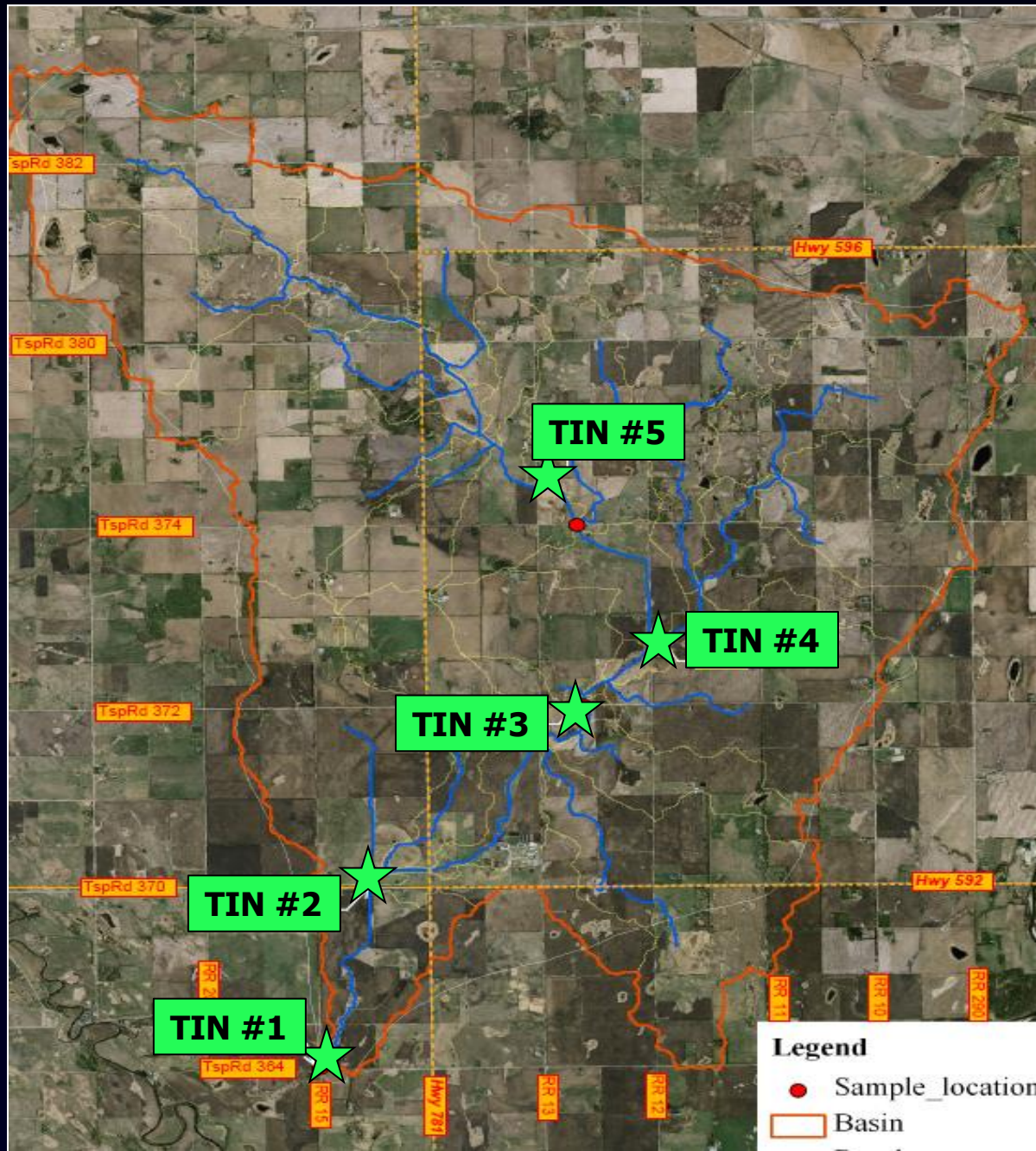


Outlet Average Nutrients 2014

- Average Total Nitrogen (TN) was **4.6 mg L⁻¹** in Acme and **2.6 mg L⁻¹** in Lonepine
 - AESA average TN 0.89 (Grassland)
- Average Total Phosphorus (TP) was **1.6 mg L⁻¹** in Acme and **0.7 mg L⁻¹** in Lonepine
 - AESA average TP 0.10 (Grassland)



Tindastoll Creek Watershed



Tindastoll Creek Land Cover

- **Central Parkland Natural subregion**
- **Primary land use is cereal cropping**
- **Hay and pasture land common**
- **Beef feedlots, hog, dairy or multi-use operations**
- **Wetlands and forested areas**
- **Riparian areas frequently grazed through**

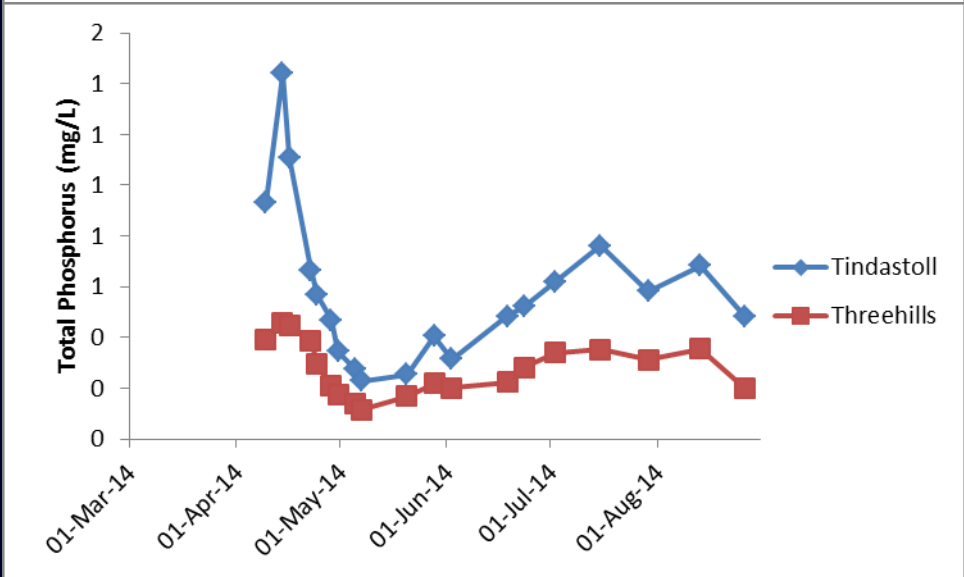
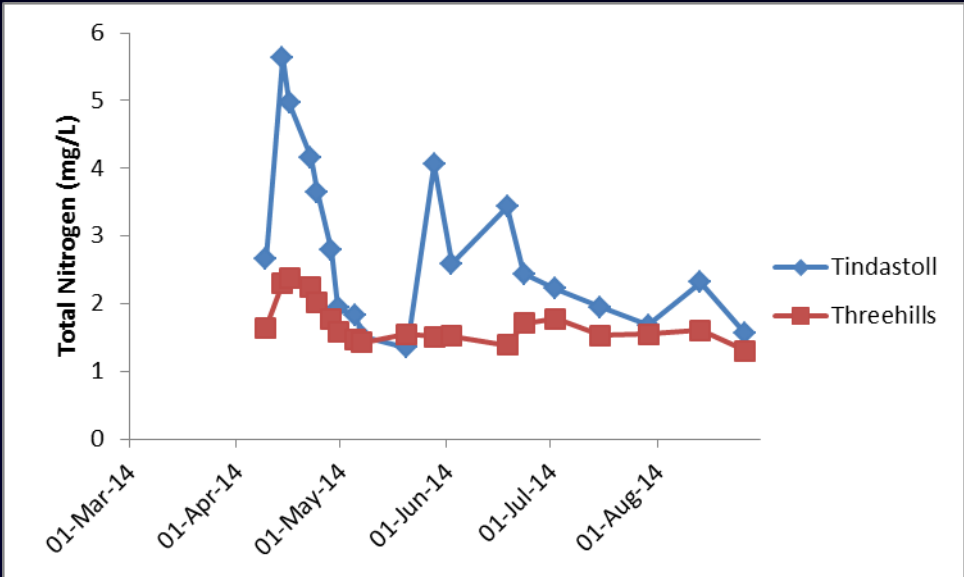


Tindastoll & Threehills Creek flows

- **Tindastoll Creek enters Medicine River and then flows into Red Deer River northwest of Innisfail**
- **Threehills Creek enters Red Deer River NW of Drumheller**
- **Flow slowed down after April snowmelt but remained fairly consistent until mid to late August**
- **Flow measurement using a Level Troll at Tindastoll and Environment Canada gauging station at Threehills**



Outlet Nutrient Trends 2014



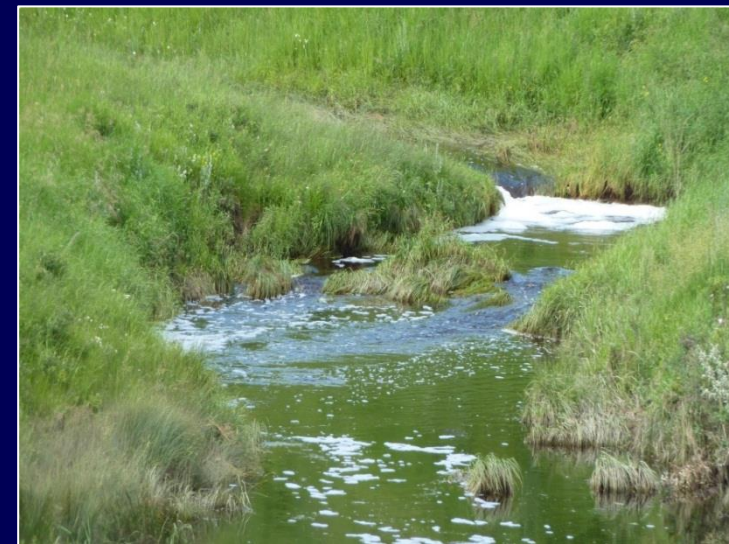
Outlet Average Nutrients 2014

- Average Total Nitrogen (TN) was **2.5 mg L⁻¹** in Tindastoll and **1.7 mg L⁻¹** in Threehills
 - AESA average TN 2.42 (Parkland) mg L⁻¹
- Average Total Phosphorus (TP) was **0.56 mg L⁻¹** in Tindastoll and **0.28 mg L⁻¹** in Threehills
 - AESA average TP 0.42 (Parkland) mg L⁻¹



Future Work 2015

- **Winter aerial flyovers**
- **Continued flow and water quality monitoring**
- **Riparian surveys in treatment watersheds**
- **Producer and Community Engagement activities**
- **APMT producer consultations and BMP planning**
- **APMT improvement and validation**



Thank You

