

DEVELOPING A TREATMENT PROCEDURE TO PROTECT ALBERTA'S IRRIGATION PIPELINES FROM INVASIVE MUSSELS

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April 13, 2016

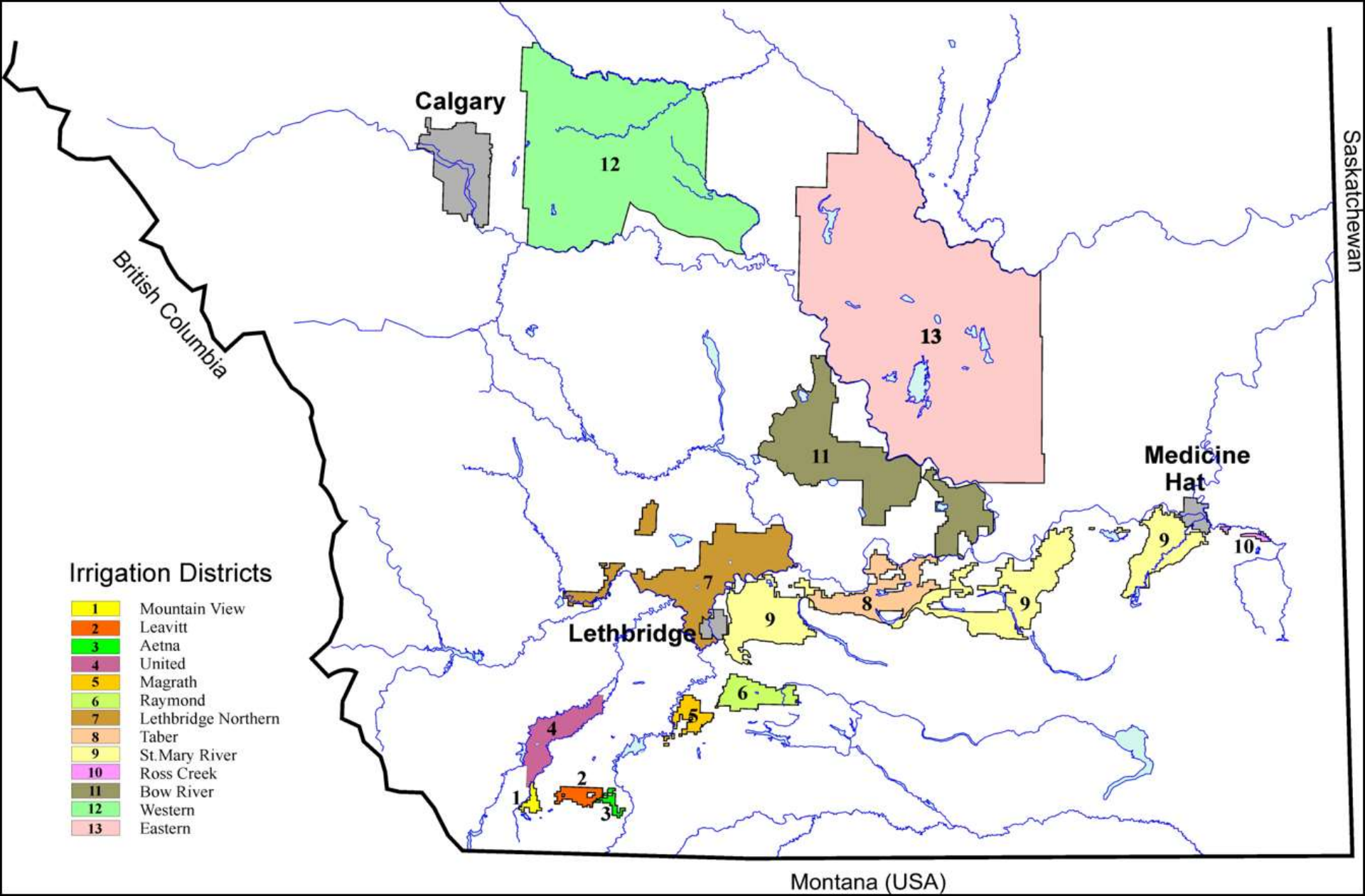
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Value of Irrigation in Alberta

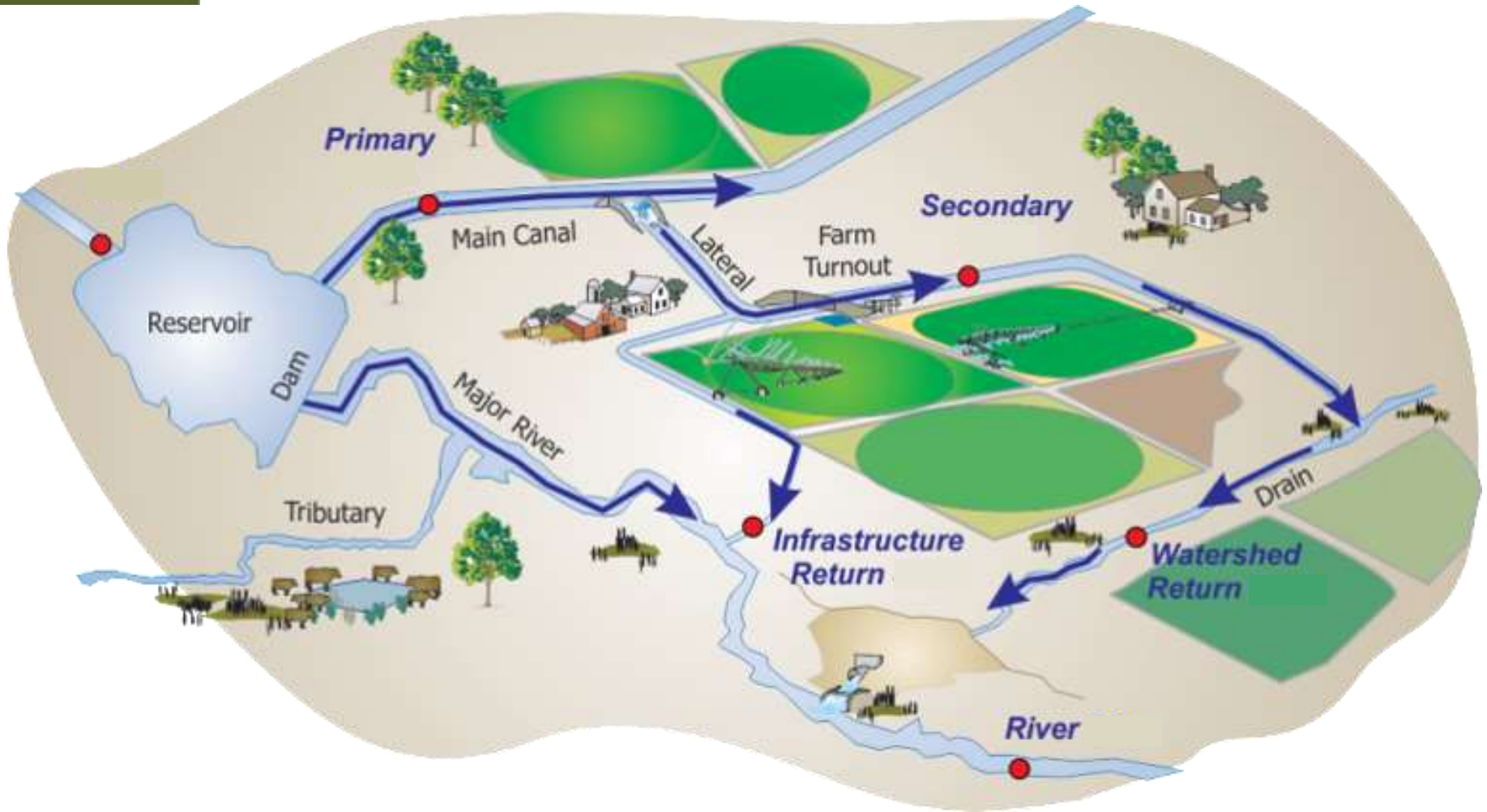
- **Value added productivity**
 - Specialty crops and food processing
 - Livestock industry
- **30 municipalities**
 - Drinking water and industrial use
- **Wildlife habitat**
 - 32 000ha of wetlands
- **Recreation**
 - Fishing, boating, camping, golfing



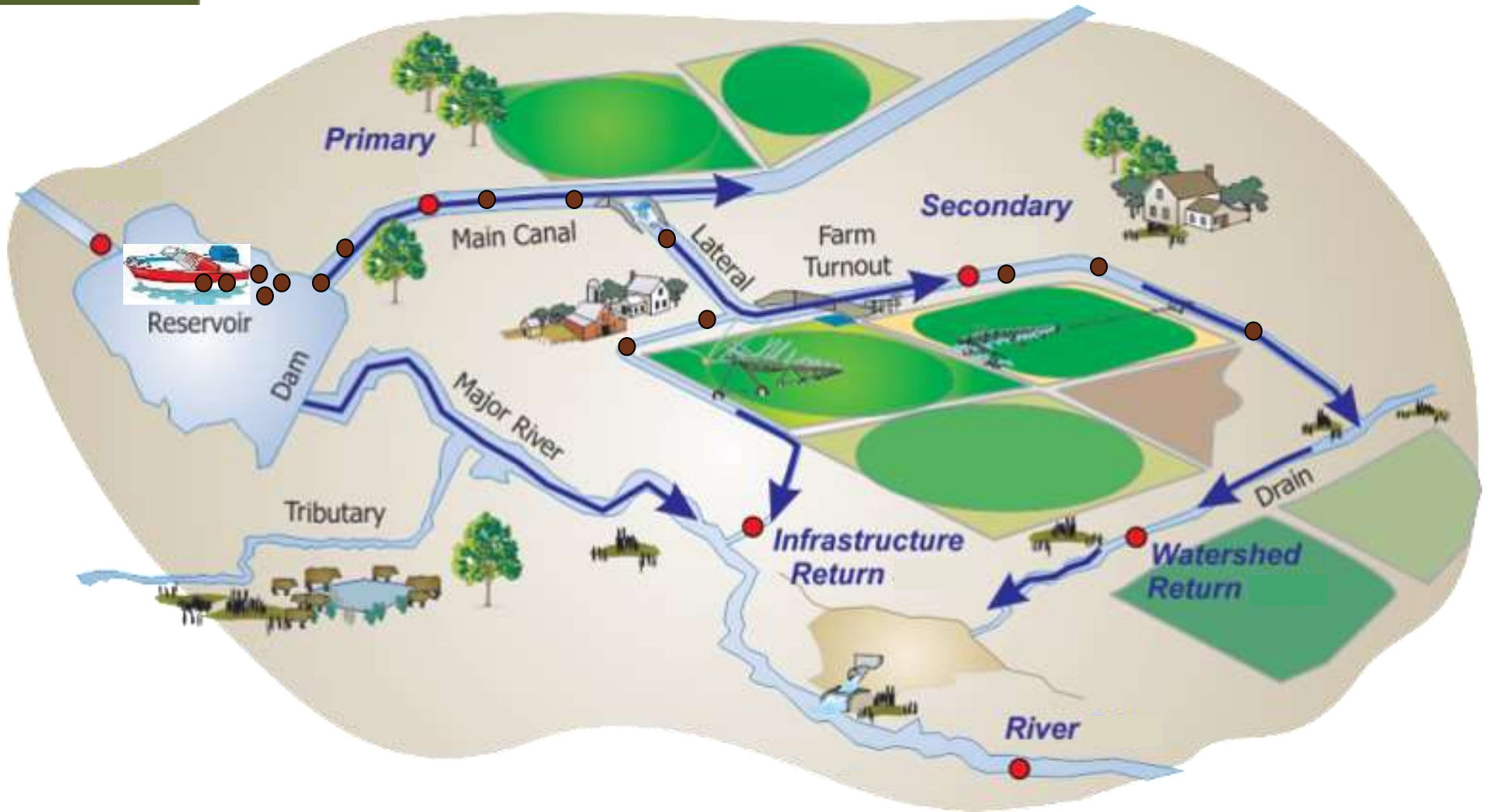
Alberta's 13 Irrigation Districts



Alberta's Irrigation Infrastructure



Alberta's Irrigation Infrastructure



Increase of irrigation pipeline in Alberta

Water conservation and water-use efficiency

- Conversion of open canals to buried pipeline
 - Low pressure pivot systems



- 4000 km canals, 4000 km pipelines
 - 2016: 50% pipeline
 - 2035: 75% pipeline



Why chemical control is needed

- **Alternative control options will not work in irrigation pipelines**
 - Thermal or vibration treatment
 - Coatings
 - Pipeline Pigging
 - Desiccation (drawdown or turning water off)
- **A chemical applied through a fertigation* approach may protect farmers' mainlines and sprinkler equipment.**
 - **The injection of fertilizer into an irrigation system*
- **Pipelines must be treated separately from the affected reservoir**
 - Many irrigation reservoirs are too large to be treated as a whole
 - Wind and wakes could distribute undetected free-floating veligers to irrigation outlets before they are discovered in a reservoir

Potash and Irrigation Pipelines

- In parts of the world, potash is commonly used as a fertilizer
- In Alberta:
 - irrigated soils are generally sufficient in K^+
 - irrigation water generally has 2 mg/L dissolved K^+
- At 100 mg/L, the KCl concentration is expected to kill mussels, with no adverse effects on soils or crops.
 - is less than K^+ concentration in most manure applications
- Minimal effects to humans or non-target species
 - naturally occurring minerals
 - agriculture-grade fertilizer
 - de-icing agents and manufacturing



Research objectives:

Spring 2016 to Fall 2017 (2 years)

Eastern Irrigation District and Alberta Agriculture and Forestry

1. develop and test potash preparation methods and pipeline injection equipment,
 2. determine how to ensure a steady concentration of 100 mg/L of potassium (K^+) for a 'lethal dose' in all pipelines,
 3. document and assess irrigation of potash-treated water on soil and crop health, and
 4. confirm economic costs.
- **Know how to apply potash to pipelines in an emergency**
 - **This research may support registration of potash with the Pest Management Regulatory Agency (PMRA)**

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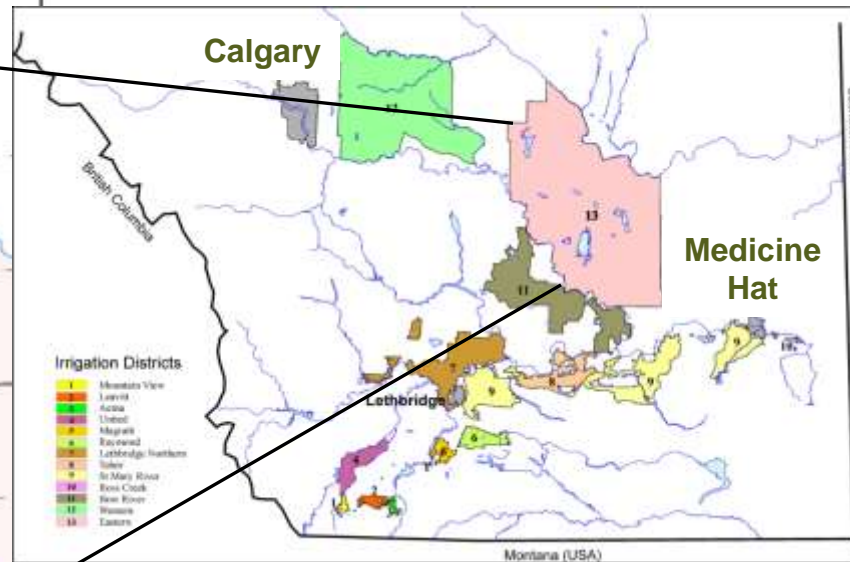
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Eastern Irrigation District - Overview Map

Study area- Eastern Irrigation District



- 121 000 hectares irrigated farmland
- Crops grown include forage, specialty, cereal, and oil seed
- 3 popular reservoirs (boating, camping, fishing)

Objective 1- Preparation and injection

- **Scaling up: Lab to field mixing and filtering for clear KCl solution**



How to get from here...



...to here.

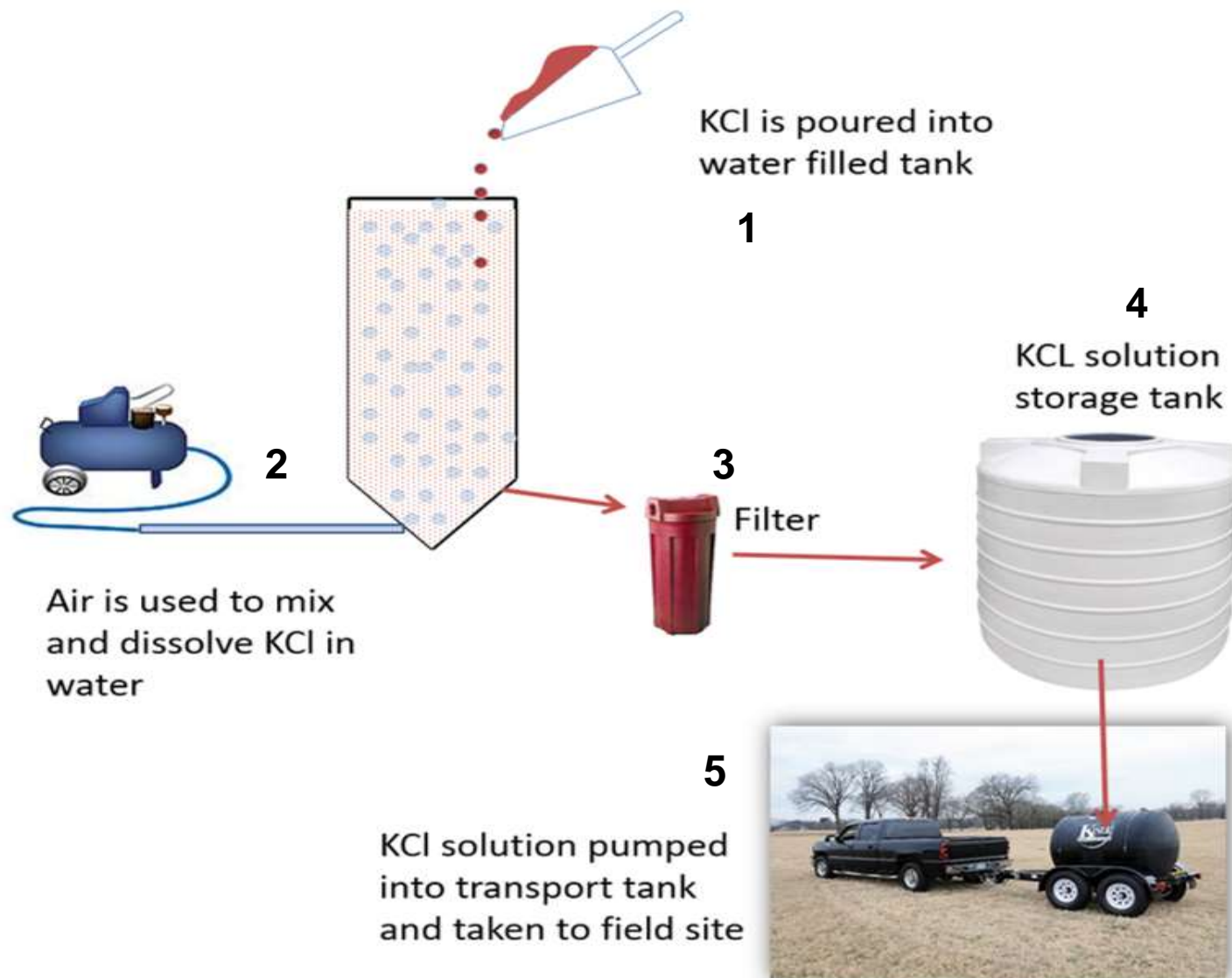
Objective 1- Preparation and injection

Scaling up: Lab to field



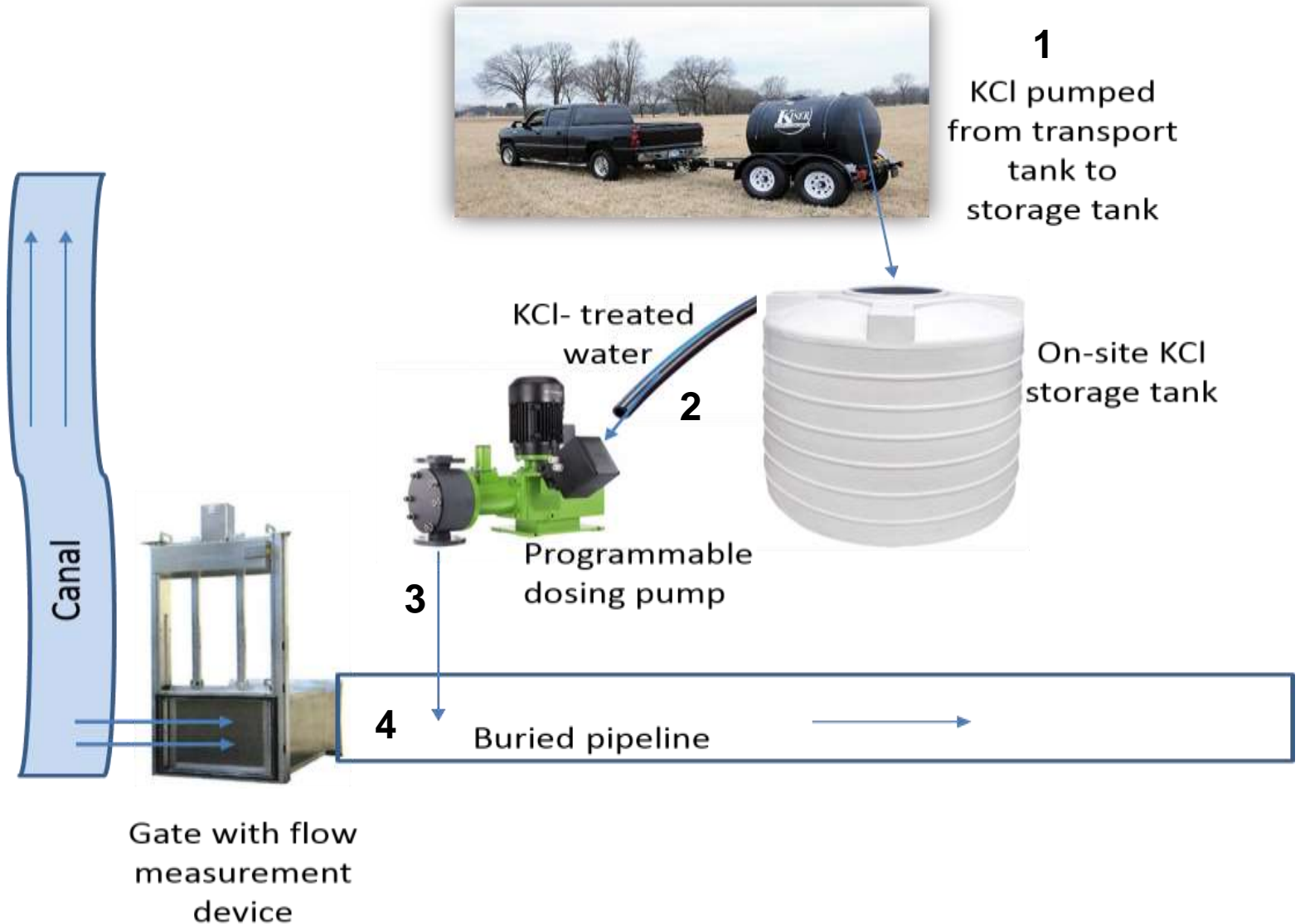
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KCl batch mixing process:



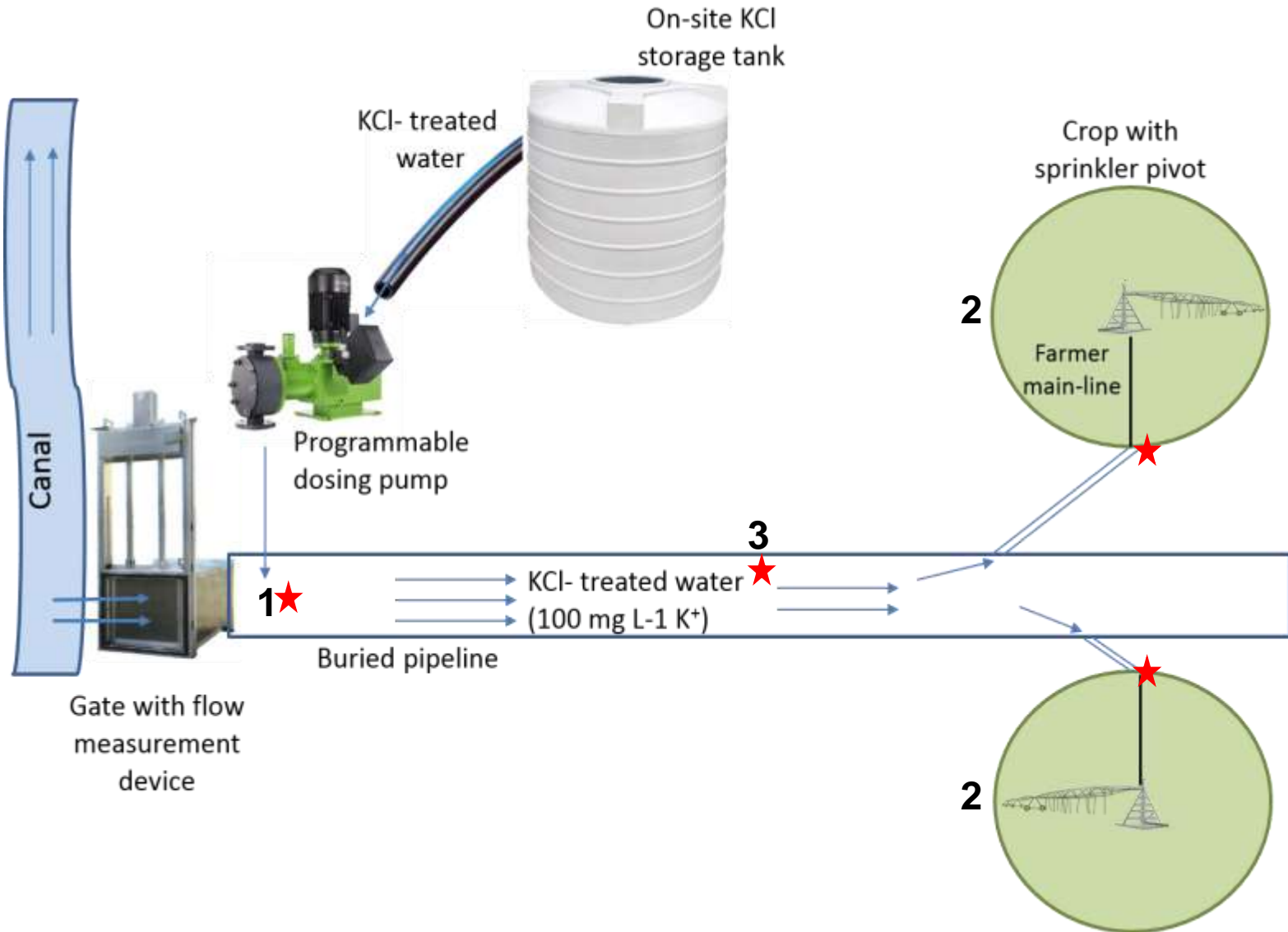
Objective 1- Preparation and injection

Pipeline injection method:



Objective 2- Steady concentration

Sampling, irrigation scheduling



Moving forward for June 2016

- **Federal approval (Pest Management Regulatory Agency)**
- **Provincial approval (Alberta Environment and Parks)**
- **Funding approval**
 - Growing Forward 2
 - Alberta Innovates- Energy and Environmental Solutions
- **Landowner cooperation**



Expected outcomes

- **Permanent fixture in Alberta's 13 irrigation districts**
 - Enhanced, cost-effective protection of irrigation pipelines against invasive mussels
- **AF's research will support EP's pursuit of full registration of potash as an option to control invasive mussels in Alberta**
 - Pipelines
 - Canals
 - Open waterbodies



Thank you

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Alberta Irrigation
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