Redeploying Water Retention: Green Infrastructure and Phosphorus Capture in the LWB

Joey Simoes, MSc, EIT, Contact: joeysimoes@gmail.com

Lake Winnipeg Basin Program Symposium

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IISD

Background

Water Retention in Manitoba

When poorly managed or abandoned

- Overgrown with invasive plant species
- Reduced flood storage (often their main purpose)
- Can result in additional phosphorus loading

What can we do?

- Study the redeployment of water retention sites as green infrastructure with greater priority on P-removal

Selection of study site

- Seine-Rat River watershed identified as source of high P-load to the Lake Winnipeg Basin
- De Salaberry Water retention is the largest of its kind under the conservation district's management

Background

De Salaberry Water Retention

Features

- Capacity of 376 acre/ft at dyke
- Outflow through 600 mm culvert
- 25 m emergency spillway
- Designed to drain from full in about 16 days

History

- Constructed between 2010-2012
- First use in spring 2013
- Spillway reconstructed for the 2017 spring runoff

Objectives

Develop a Nature Based Solution for P-reduction in the LWB

1) Create a hydrologic and nutrient transport model at De Salaberry
   - Monitor site parameters
2) Implement beneficial management practices
   - Water level control and selective harvesting
3) Create inventory of suitable water retention sites in the LWB
   - Extrapolate benefits from implementation of management strategy

Objectives

Evaluation of environmental and economic co-benefits

Flood storage performance
- Derived from hydrometric monitoring

Mass of P captured
- Water quality in vs out of site

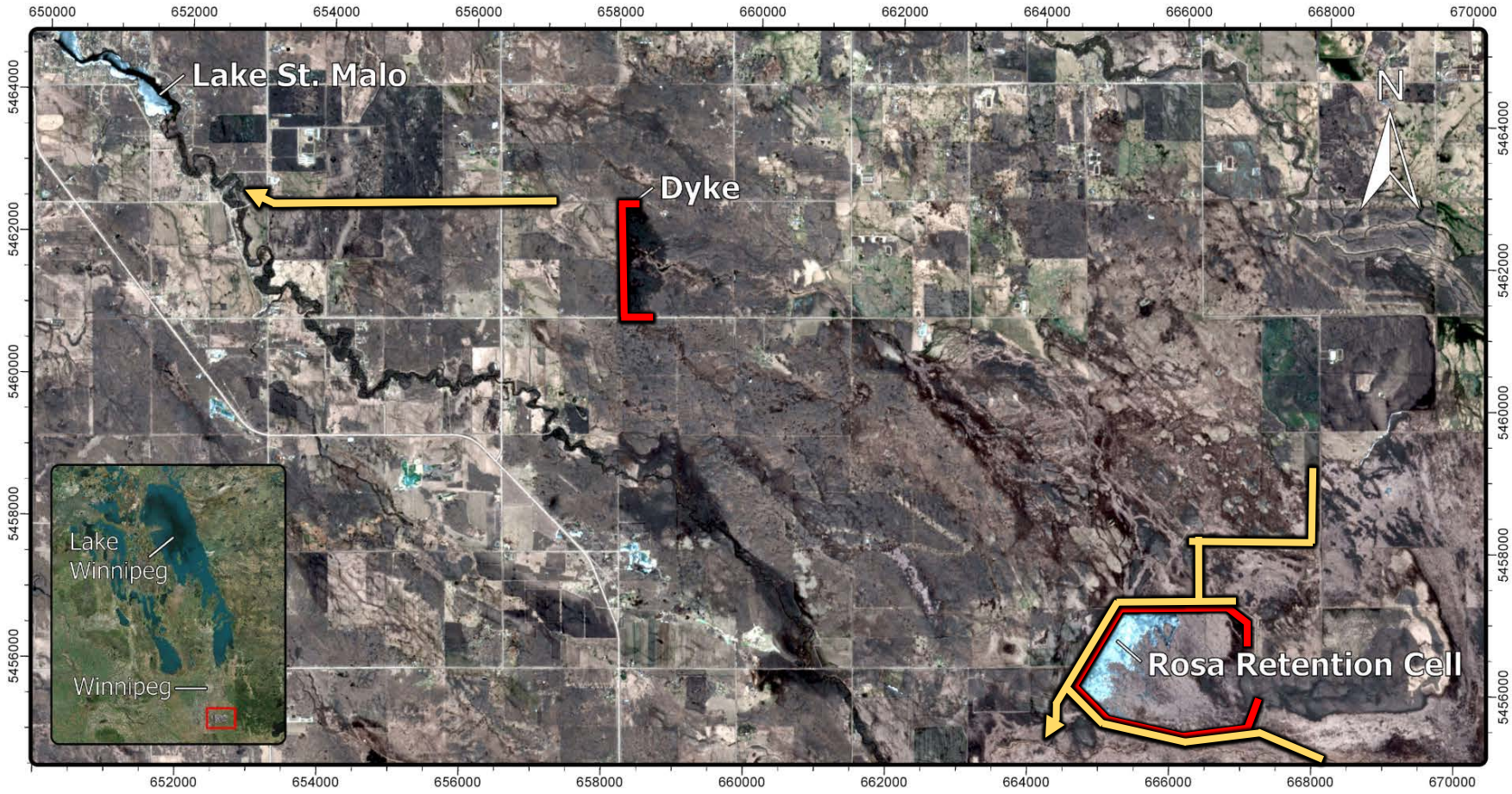
Area of wetland habitat restored
- Monitoring of wetland health and biodiversity

CO_2 displaced and economic incentives
- Sale and use of biomass as fuel, livestock bedding, and compost

Cost efficiency
- Improved management vs new projects

Current Progress

Understanding the local hydrography



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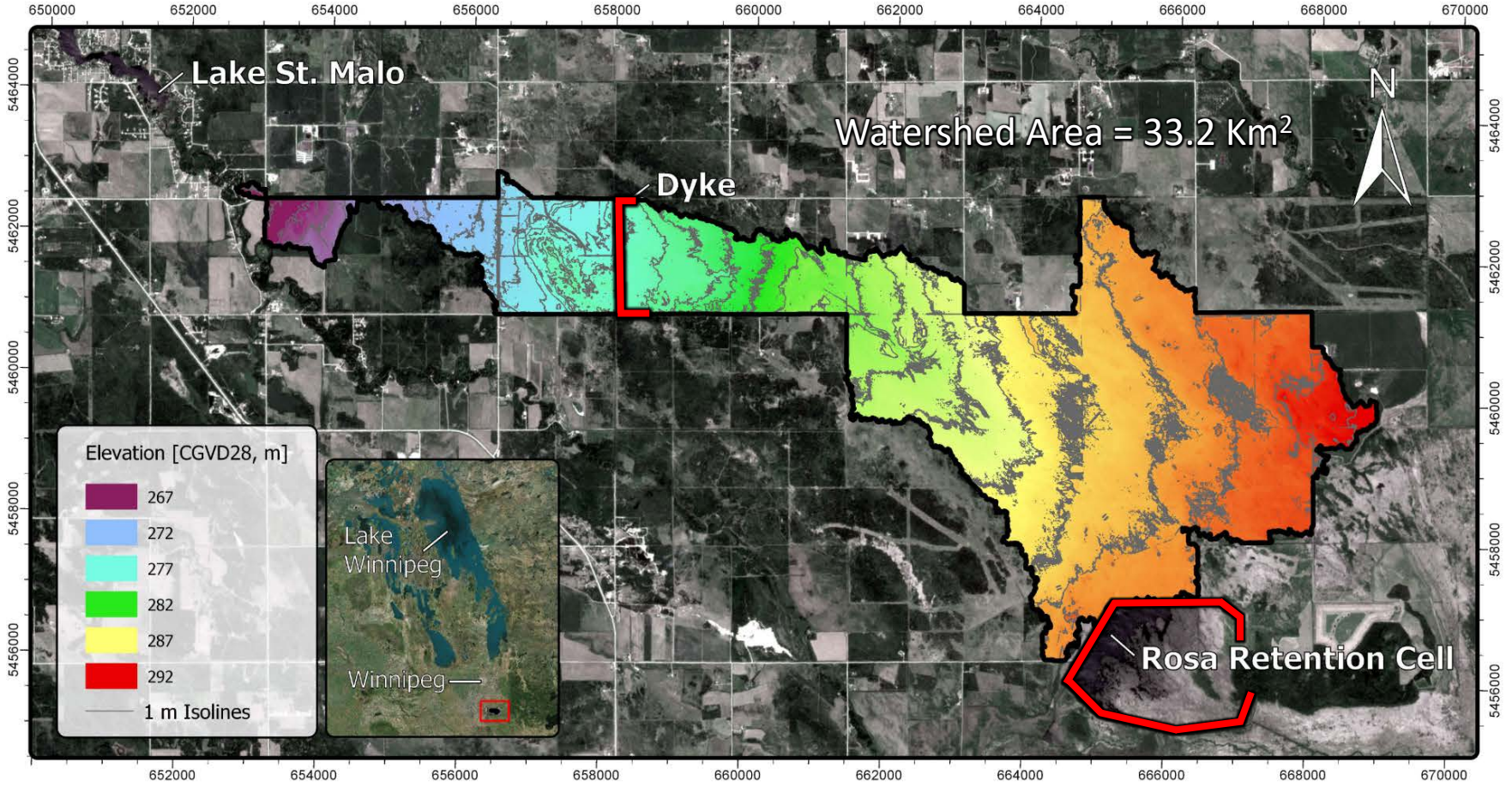
Current Progress

Watershed delineation – LiDAR DEM (MLI, 2008 & 2016)



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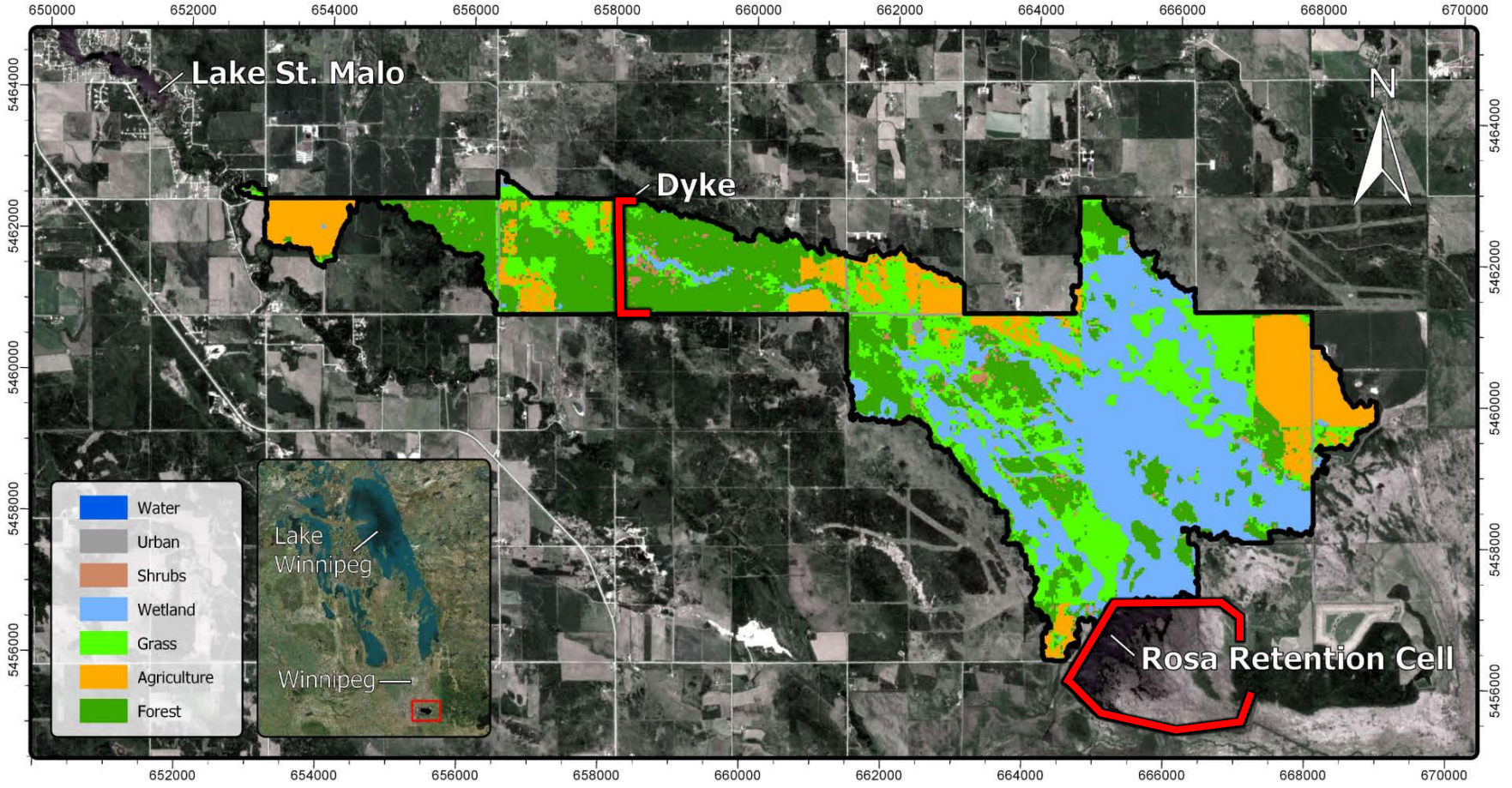
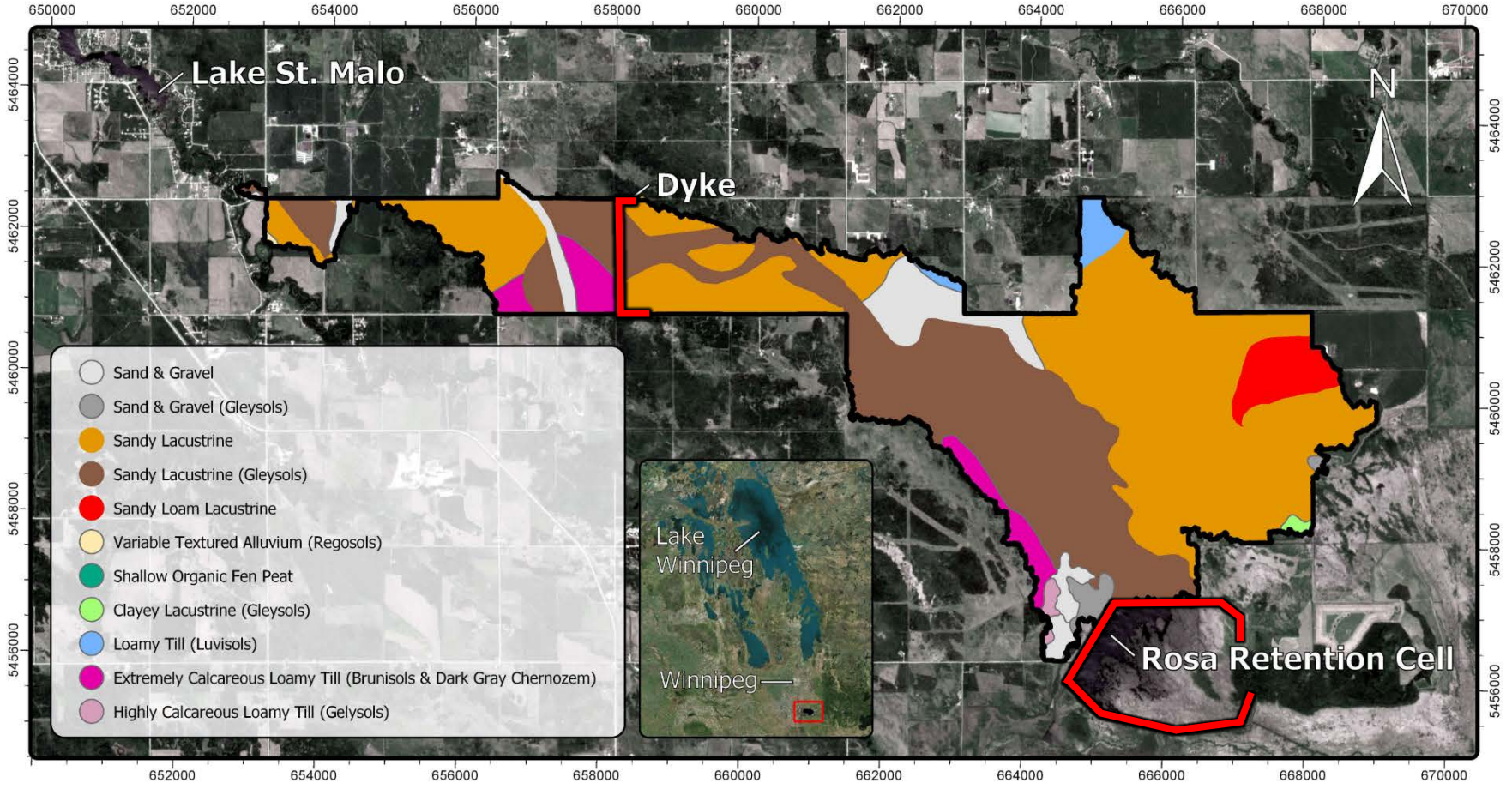
Current Progress

Watershed delineation – Landcover (AAFC & MHHC)



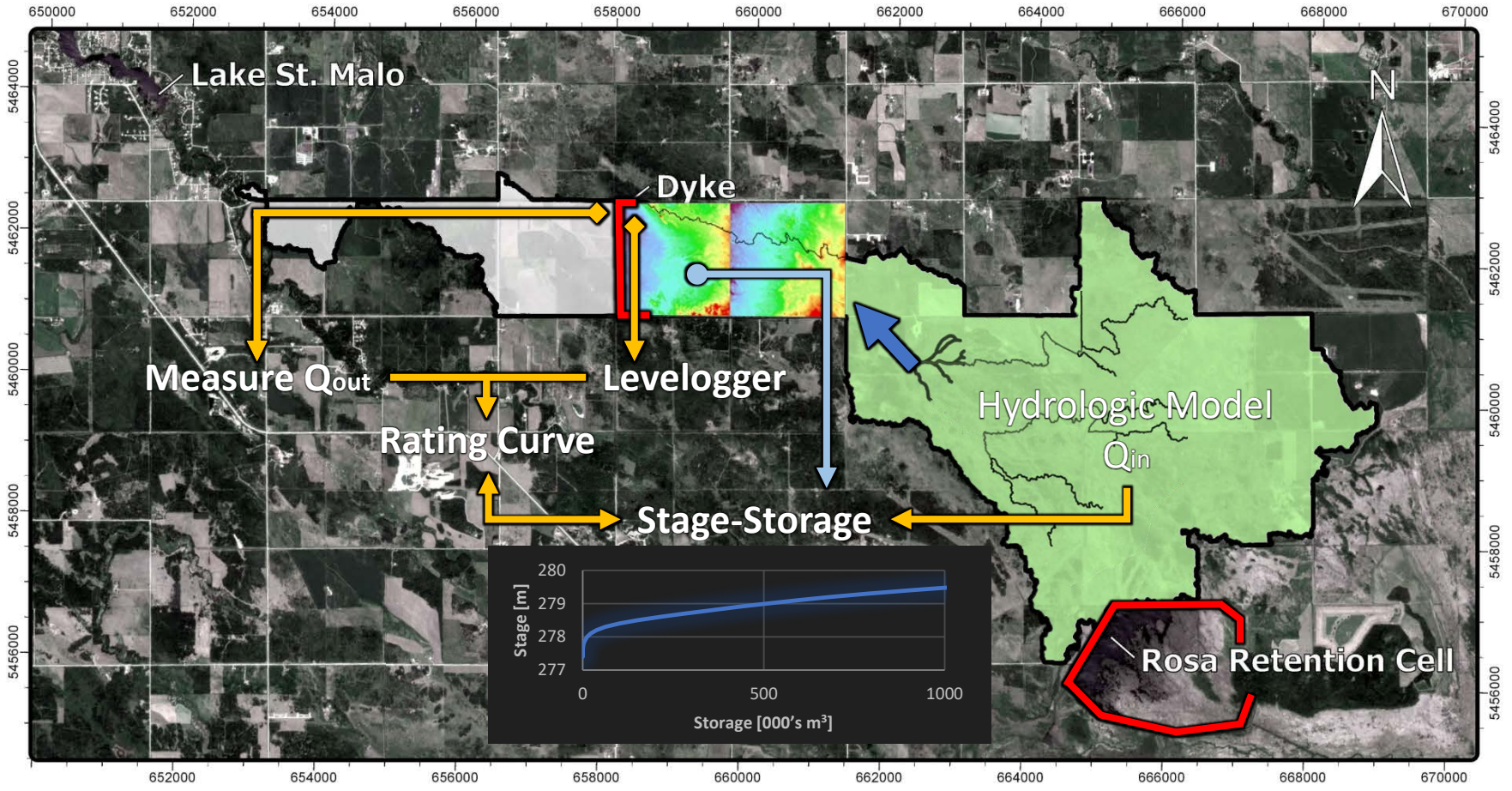
Current Progress

Watershed delineation – Soils (AAFC & MLI)



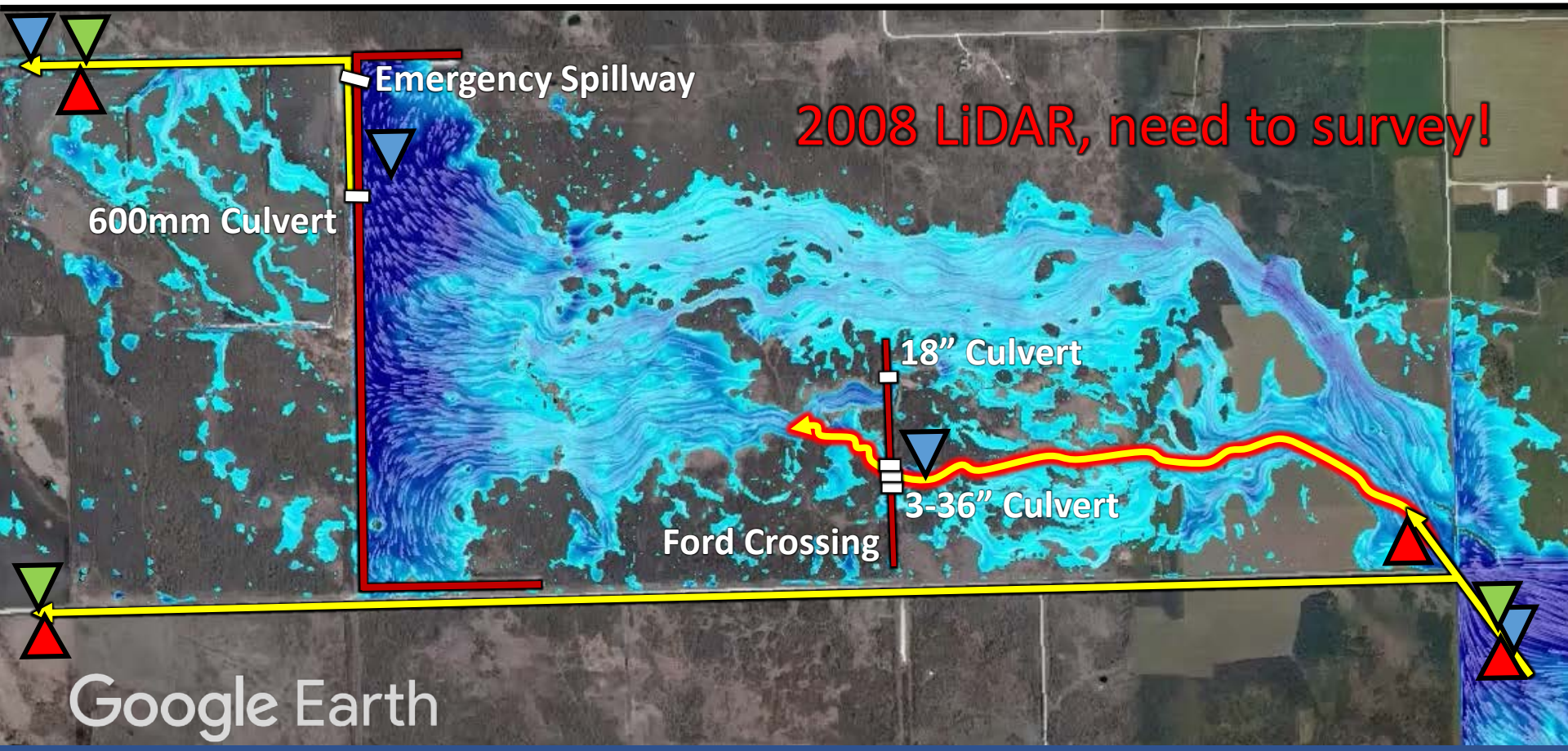
Current Progress

Hydrologic model system representation



Current Progress

Hydrodynamics and Monitoring



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Immediate Roadmap: 2019

March

- Compile existing data and characterize watershed
- Initiate field monitoring program

April

- Collect data during spring runoff
- Begin hydrologic and nutrient model development
  - We're open to suggestions!

May to June

- Begin model calibration using 2019 field data
- Develop management plan

July

- Reporting of 1st year results

Roadmap: 2019-2021

Remainder of 2019 to 2021

- Continue monitoring and modeling efforts to evolve management plan
- Extrapolate results to applicable water retention projects in the LWB to better quantify larger scale benefits
  - Flood storage performance
  - Mass of P captured
  - Area of wetland habitat restored
  - $C0_2$ displaced and economic incentives
  - Cost efficiency

Thank you to our funders & partners:

Questions/Suggestions?

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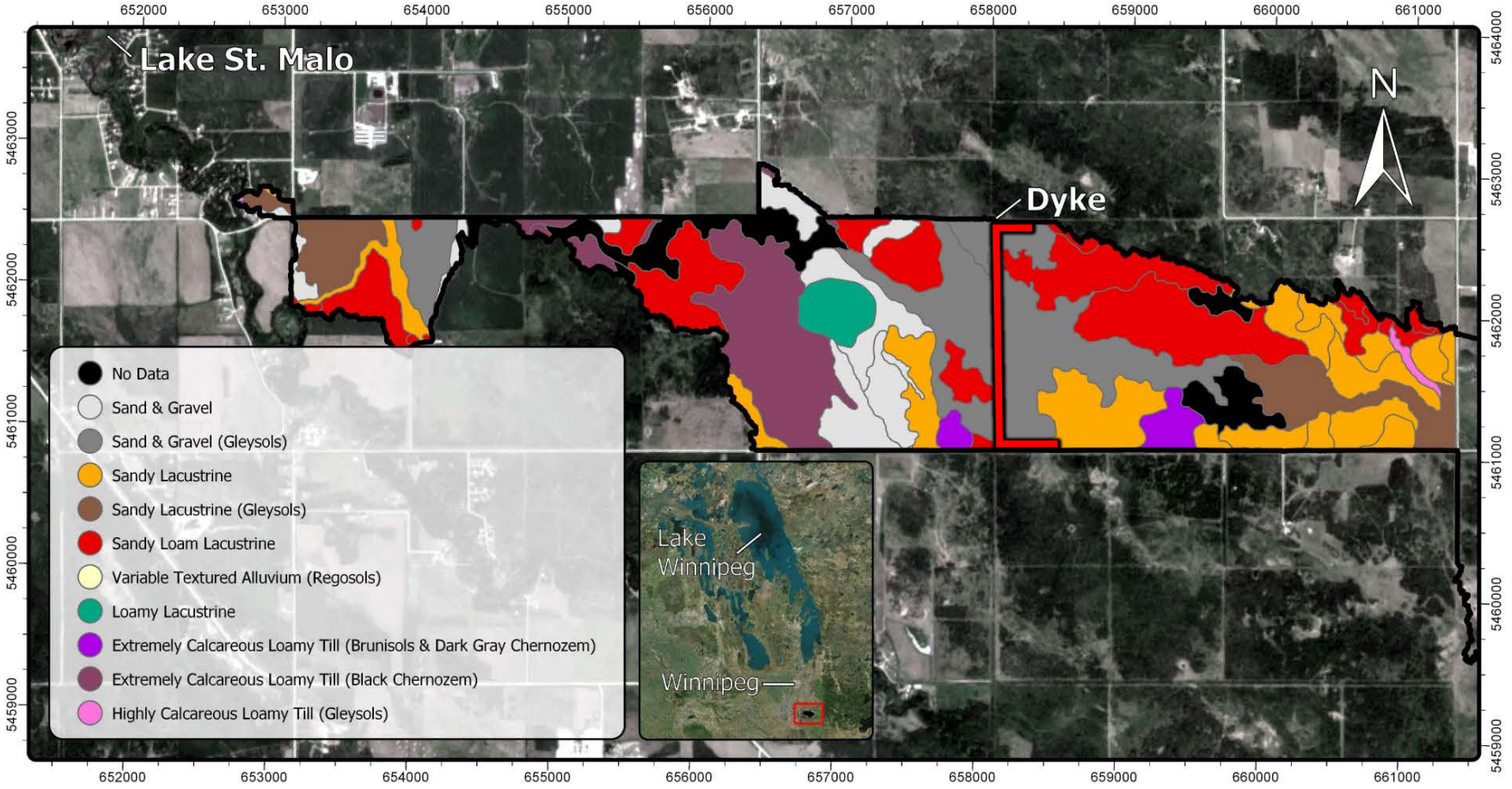
Current Progress

Watershed delineation – Detailed soils (AAFC & MLI)



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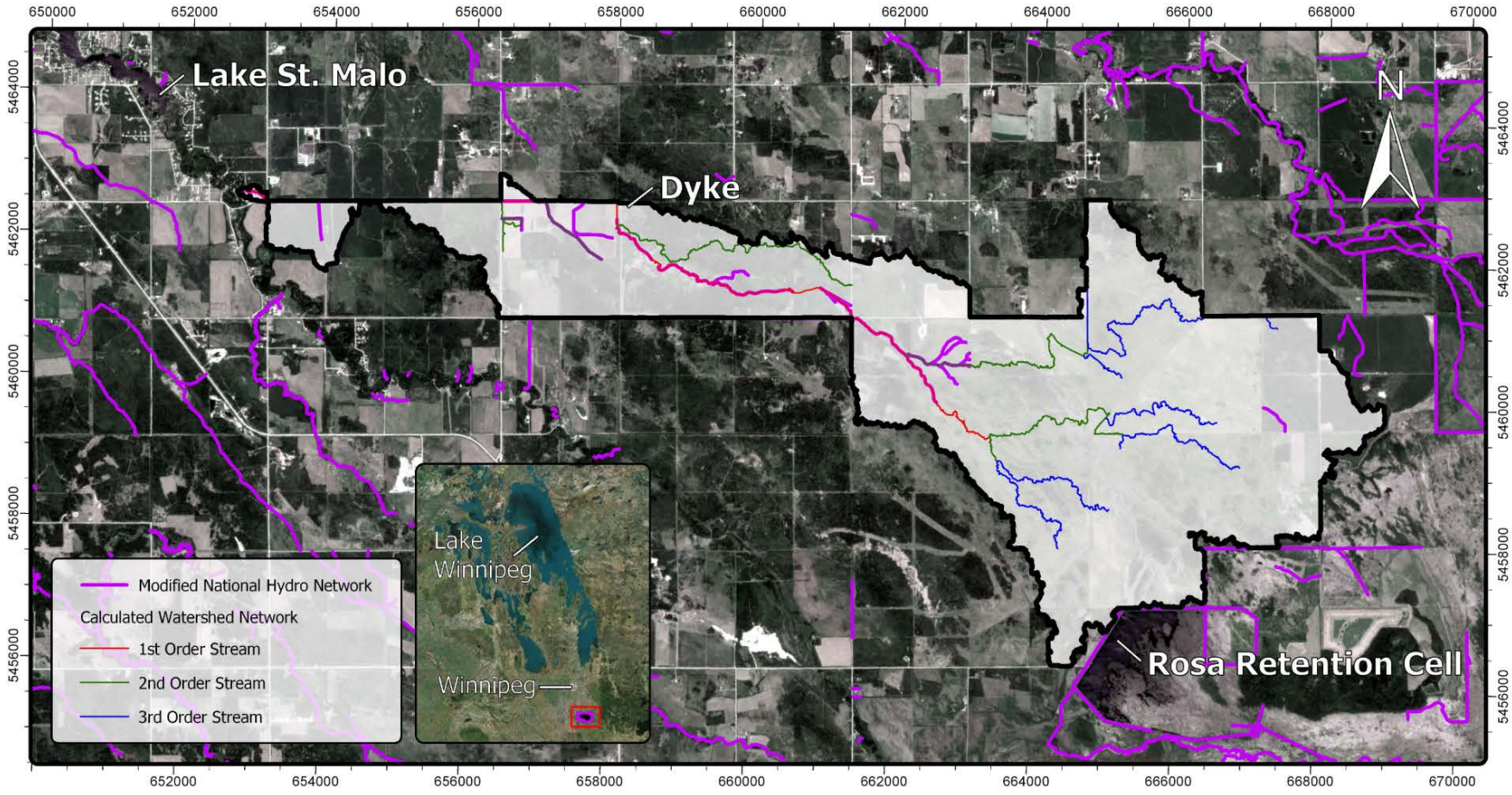
Current Progress

Watershed delineation – Stream network (NHN)



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Current Progress

Historic flow estimation

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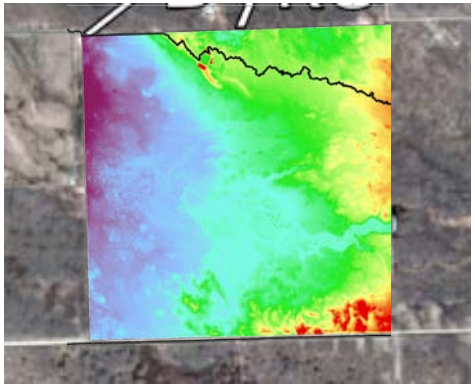

+ Rating Curve

= 2013-2018 Historic flow

- Spillway geometry change in 2017 => lower confidence for peak 2013-2016