Strategic Framework to Guide Local Water Storage Implementation (2022-081)

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BOARD OF WATER AND SOIL RESOURCES

HOUSTON engineering, inc.

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

CLEAN WATER LAND & LEGACY AMENDMENT

Agenda Item: 05b

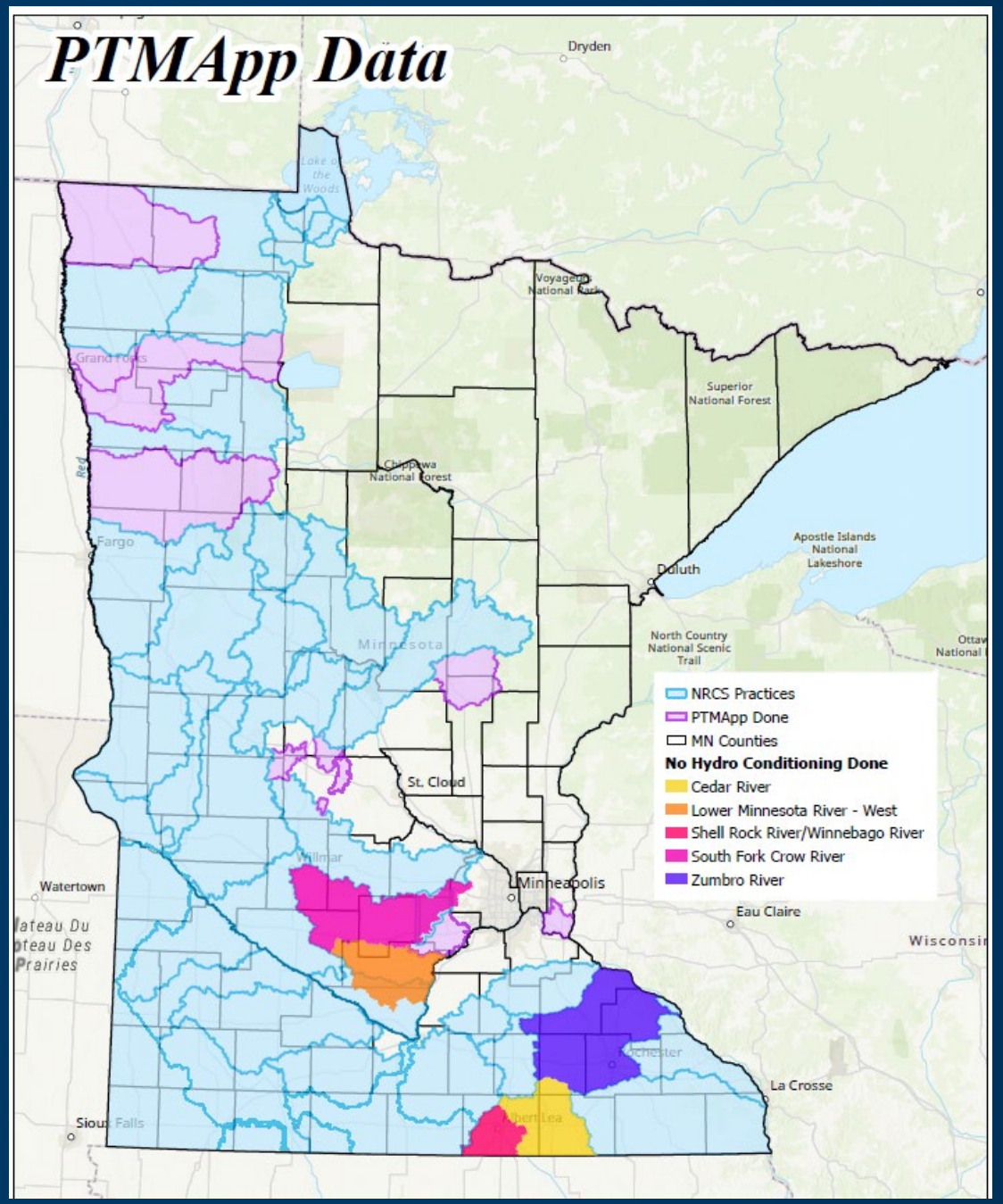
LCCMR Project Overview

Purpose: Develop a “Framework” to prioritize water storage projects strategically throughout the state. The framework will use existing data, local stakeholder input, be scalable, and emphasize multi-benefit water storage (water quality, flooding, habitat).

- Presentation Content Today
- Project background
- Project results
- Next steps and opportunities

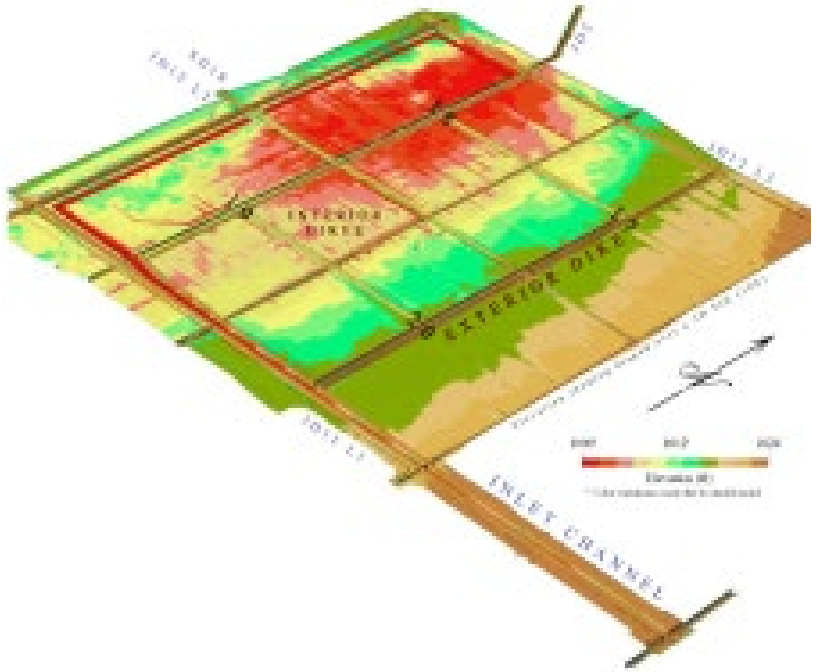
Built on existing investments in data and tools

- LiDAR
- Hydro-conditioned DEM’s
- PTMApp – estimates watershed water quality, identifies Best Management Practices, estimates effects of BMPs.

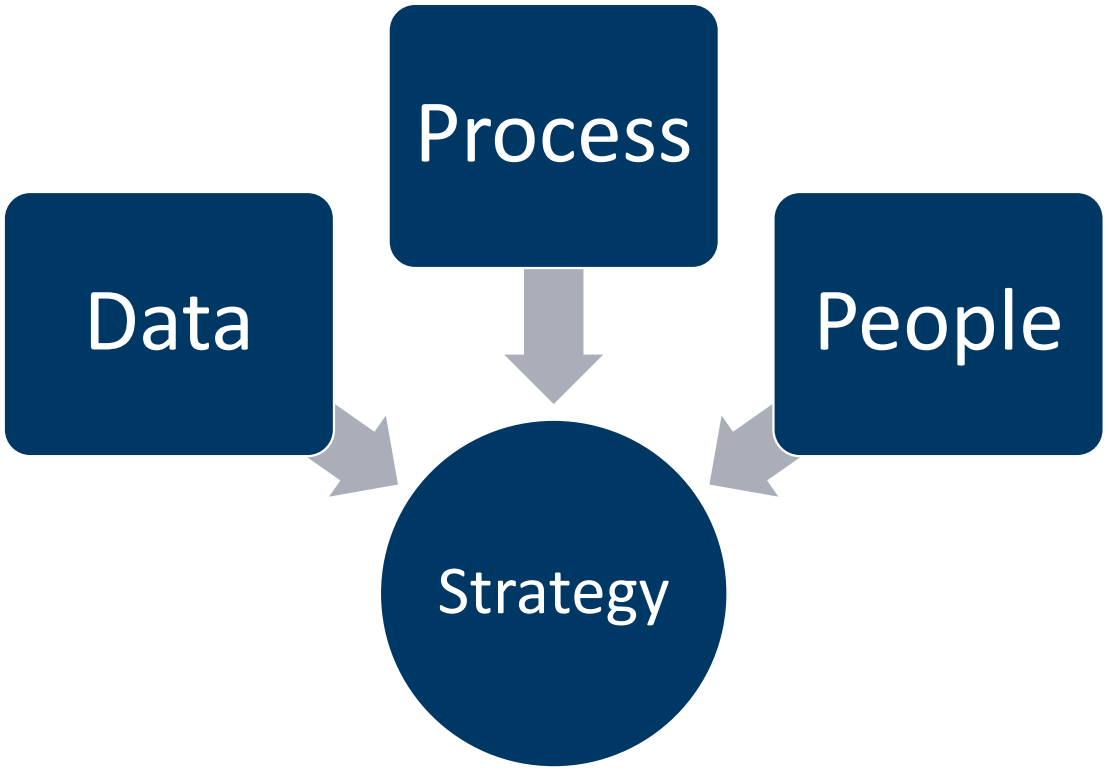


How can LiDAR be used to identify drained wetlands?

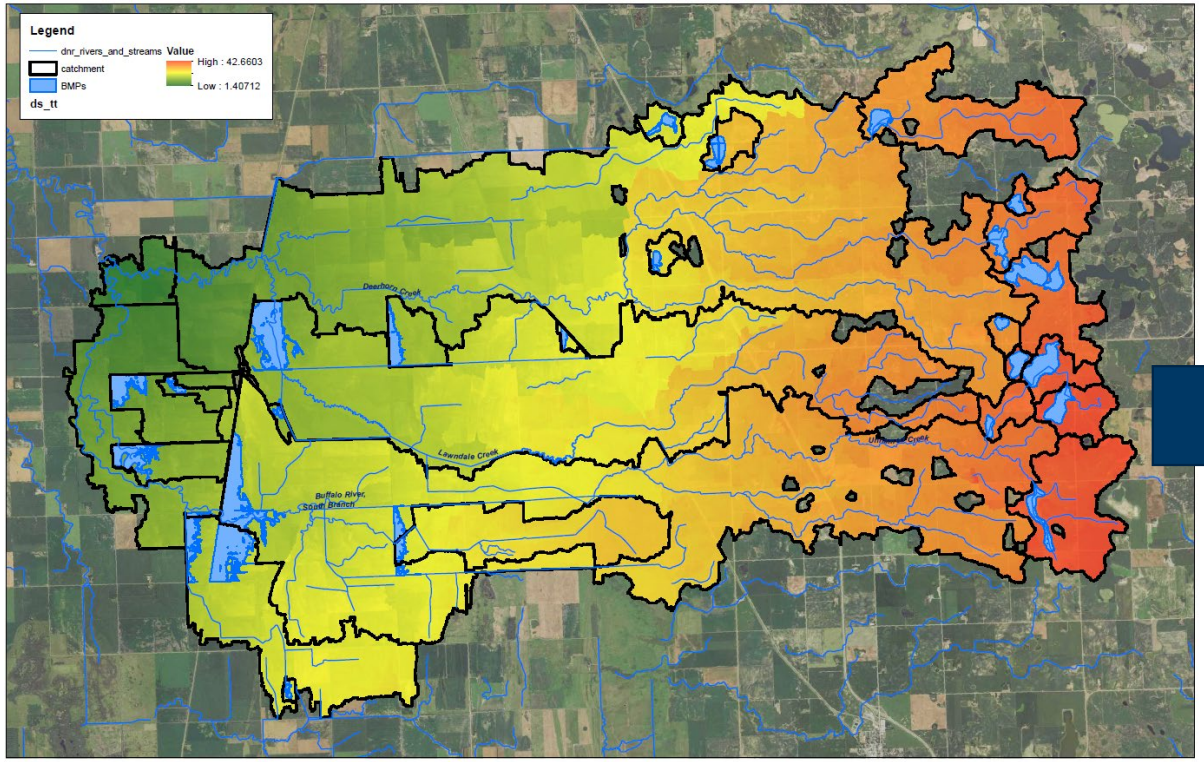
How can LiDAR be used to identify other water storage areas?

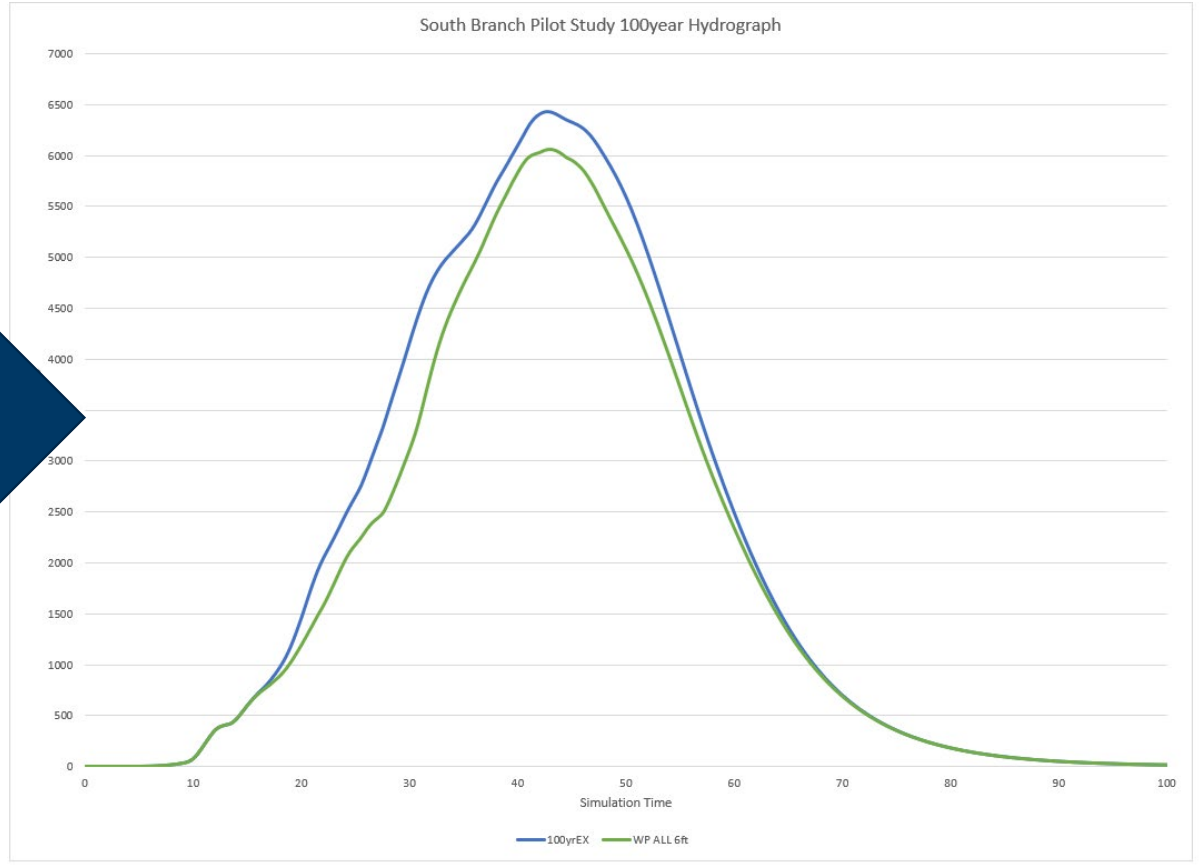


How do we engage water/resource managers with information to set priorities and make good decisions?



How do we evaluate water storage sites to meet local goals?



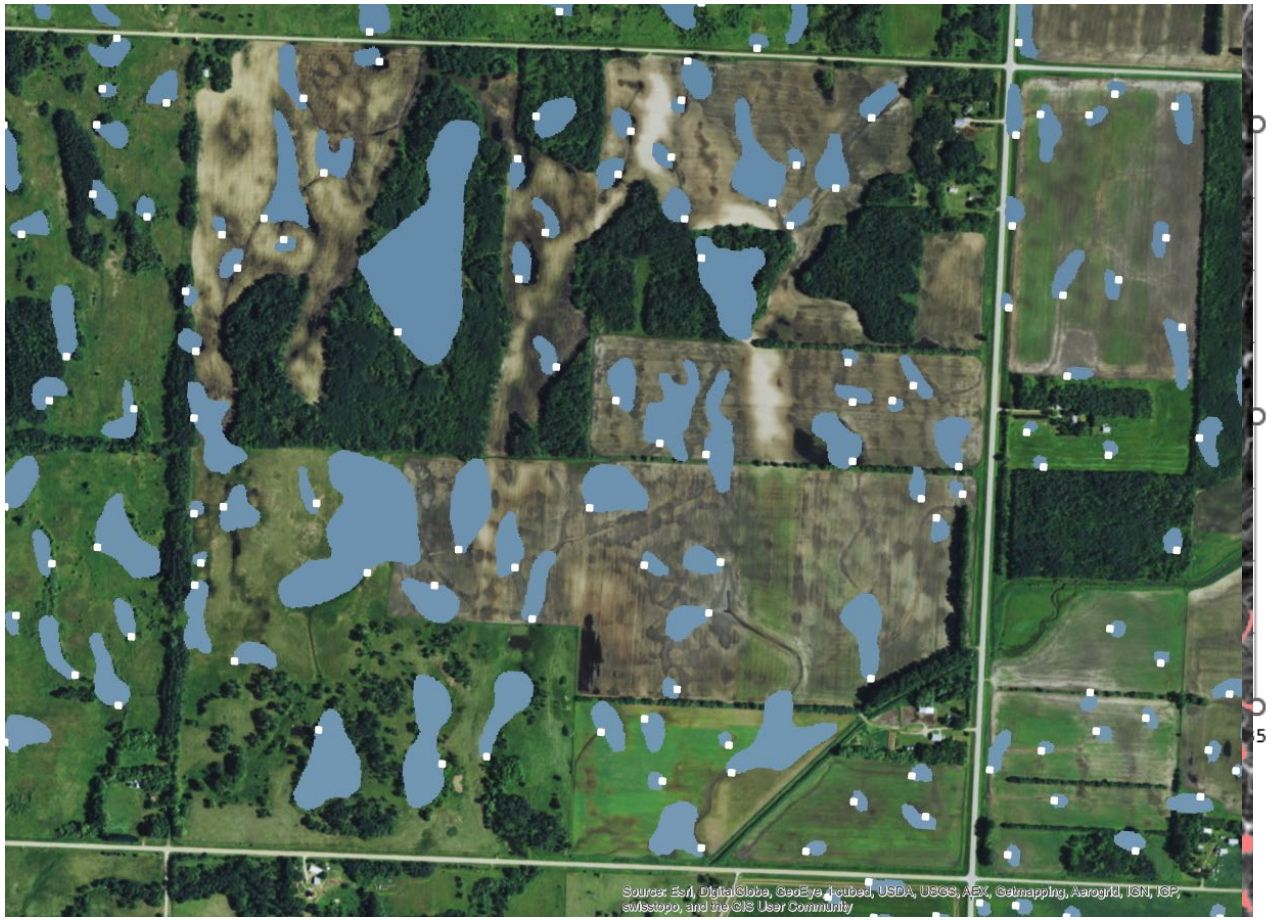


Project Components

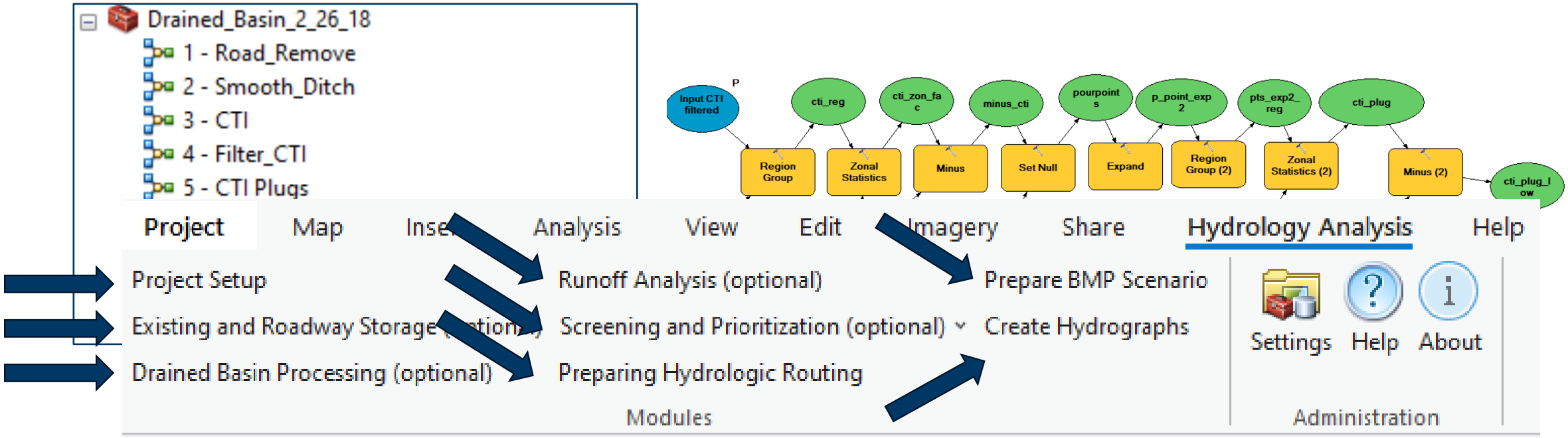
- Data / GIS tools and models (built on existing where possible)
  - Identify drained basins
  - Identify other water storage sites
  - Derive attribute for sites
  - Refine hydrology model to evaluate their hydrologic effects
- Watershed engagement process
  - Build finite process to prioritize water storage sites to meet local and watershed goals

GIS Processes to Identify Drained Basins

- Smooth ditches
- Identify areas where water pools
- Remove “noise”
- Plug outlets & fill the landscape
- Derive attributes for each site (depth, volume, drainage area, etc)

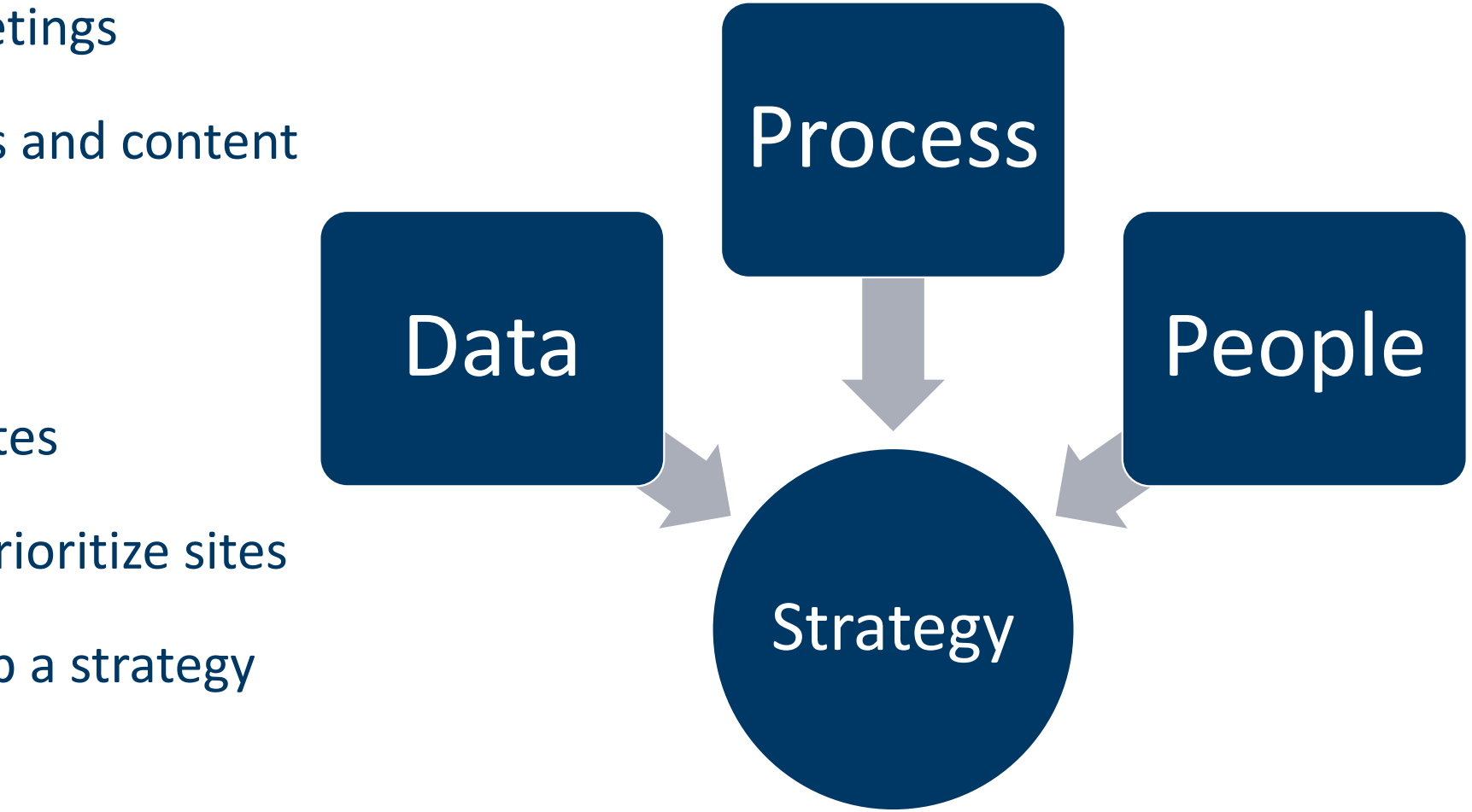


Project Outcome – from old models to new tools



Project Outcome - Watershed Engagement Process

- Finite process – 3-6 meetings
- Develop clear objectives and content for each meeting
- Review watershed goals
- Review water storage sites
- Review attributes and prioritize sites
- Evaluate sites to develop a strategy

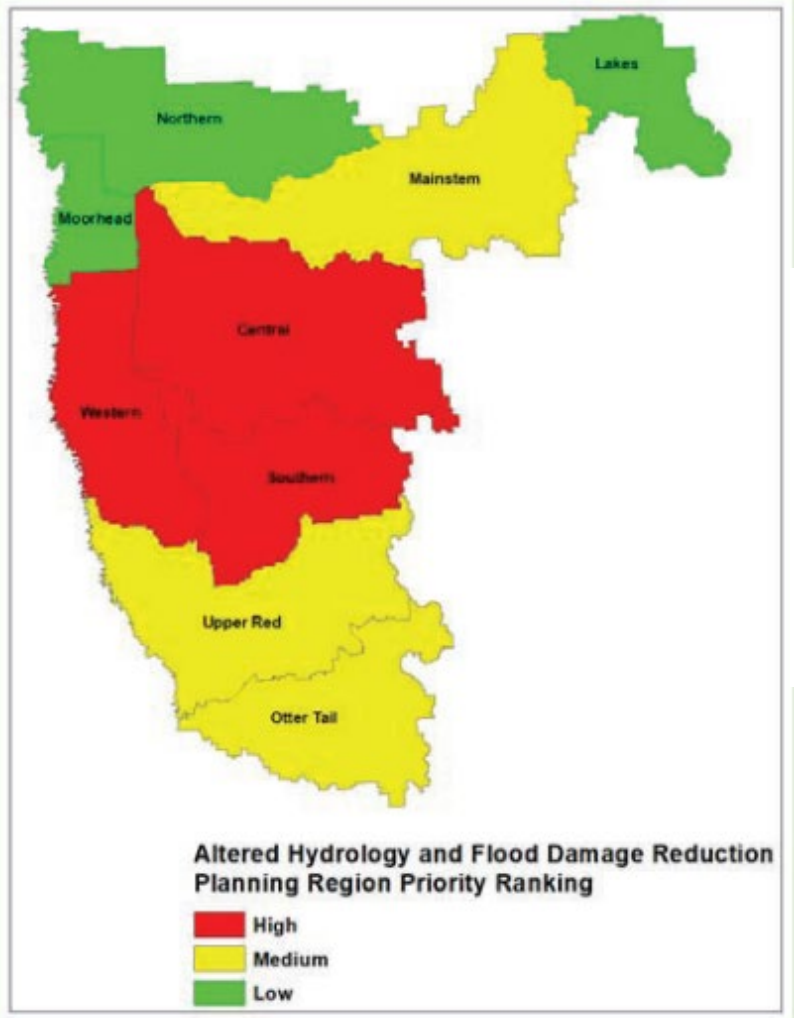


Watershed Plan Priorities and Goals

Priority Issues

- ✓ Altered Hydrology
- ✓ Flooding

Planning Region Priority



Long-term goal is 171,000 acre-feet (approx.1.79 inches) of runoff volume reduction.

Short-term goals are stated as 25% of each planning region's long-term goal, or 42,750 acre-feet (approx. 0.45 inches) of runoff volume reduction throughout the BRRW.

Planning Region Goals

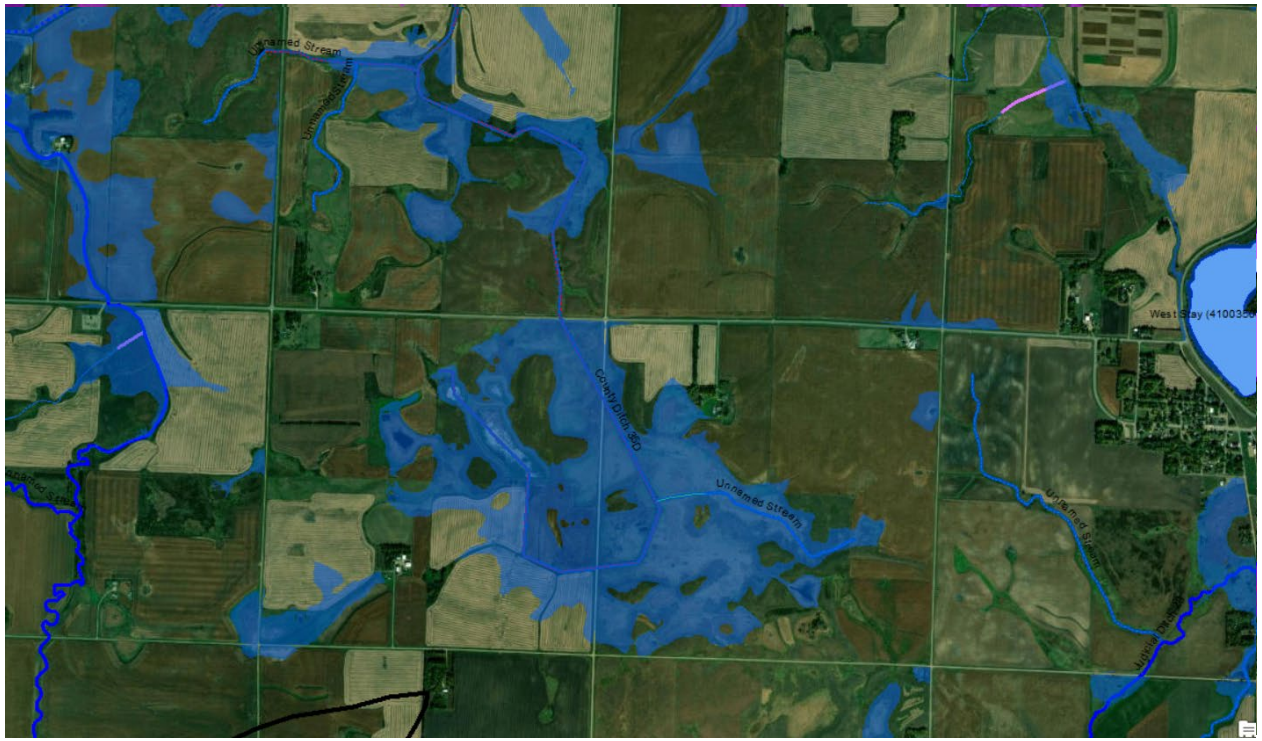
	Central	Lakes	Mainstem	Moorhead	Northern	Otter Tail	Southern	Upper Red	Western
Short-term	9,000 acre-feet	2,250 acre-feet	8,500 acre-feet	0 acre-feet	3,500 acre-feet	6,000 acre-feet	6,000 acre-feet	3,750 acre-feet	3,750 acre-feet
Long-term	36,000 acre-feet	9,000 acre-feet	34,000 acre-feet	0 acre-feet	14,000 acre-feet	24,000 acre-feet	24,000 acre-feet	15,000 acre-feet	15,000 acre-feet

Metric

Acre-feet runoff volume reduction

Current CWMP goal – 15,000 ac-ft

Results - Water Storage Sites Yellow Medicine Watershed



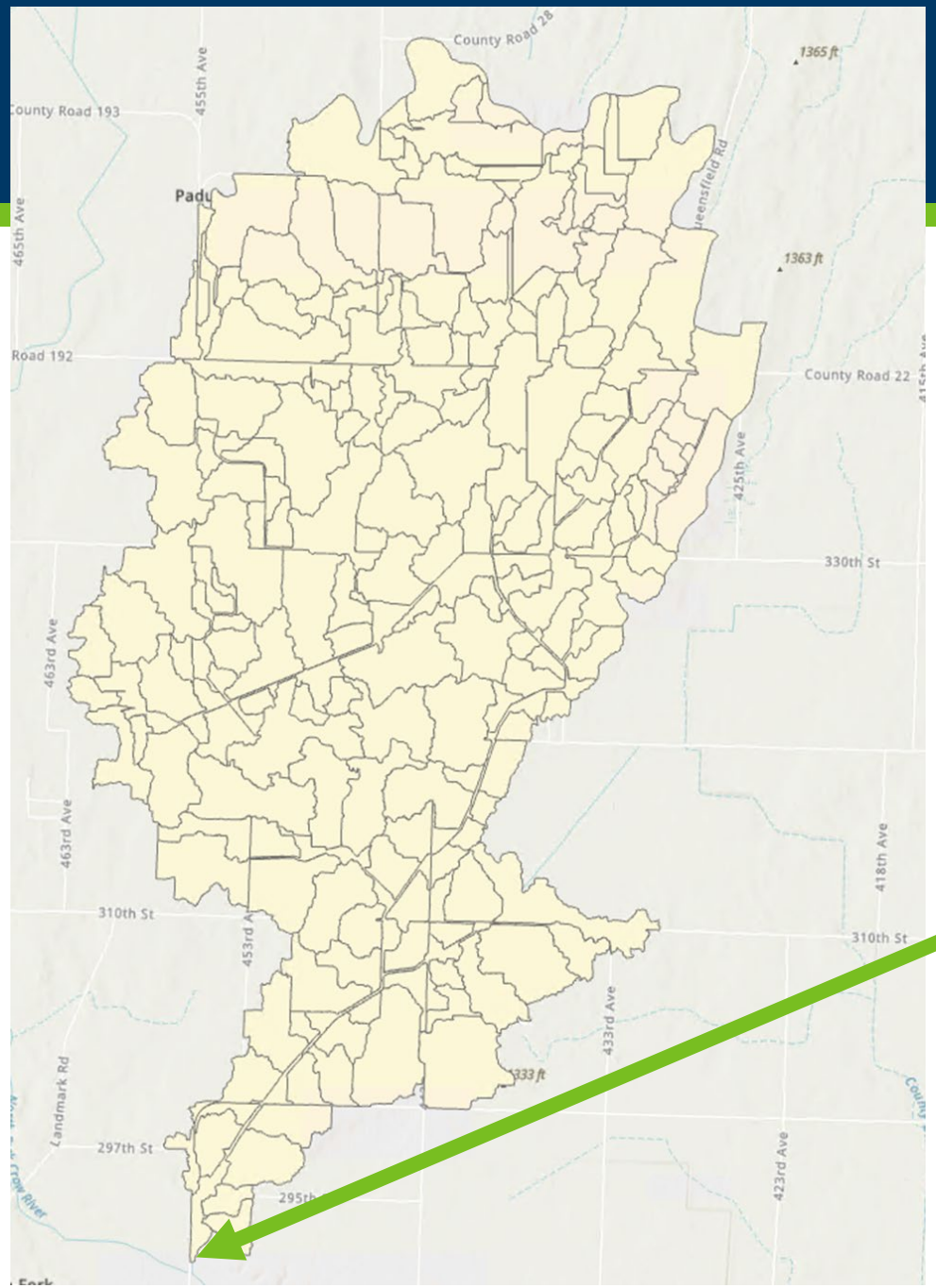
Storage Type	# / Count	Volume (ac-ft)
Depressions	5,068	76,070
Restorable Wetlands	33,233	191,461
Road Related Storage	3,503	317,527

Results - Prioritization Process and Decision Making

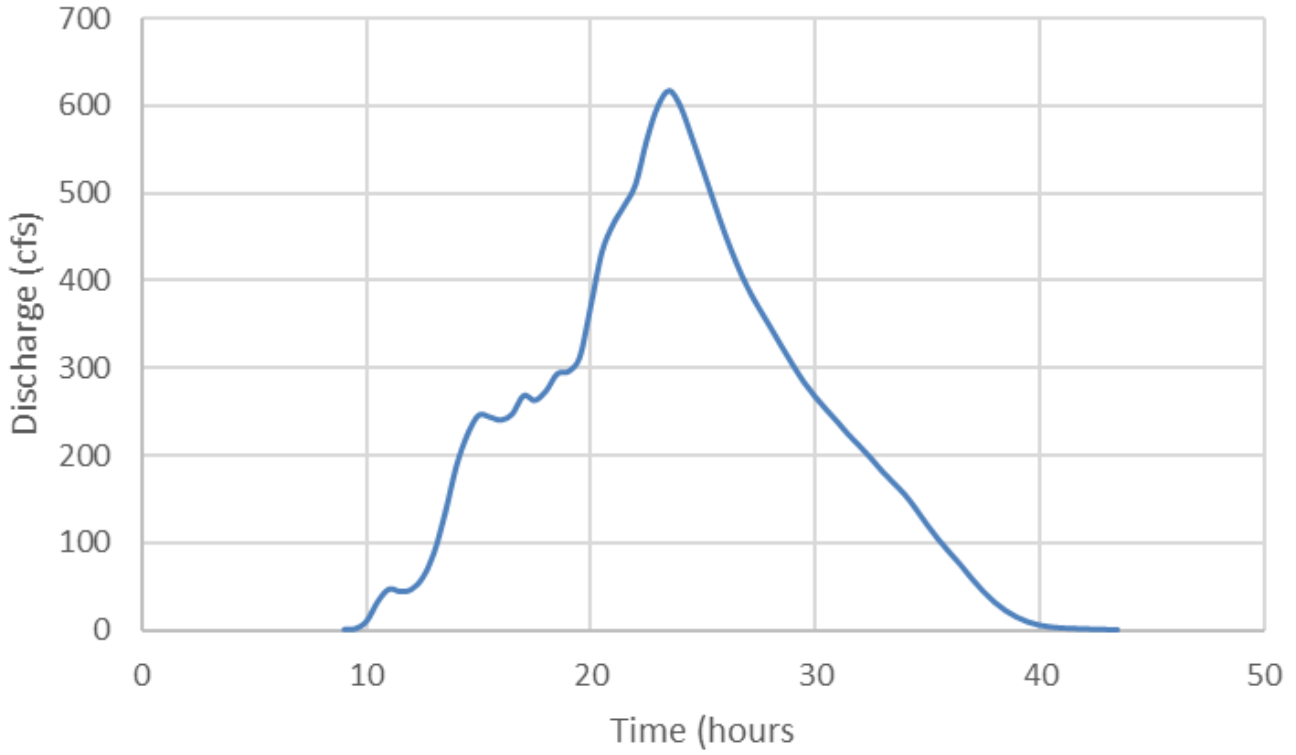
- Which sites have only one or two landowners?
- Which sites have a high/medium/low runoff capacity?
- Which sites are on or near public land?
- Which sites have less than 20% cropland?
- Which sites are most likely to have comparitively low water permitting issues?

Water storage site data can be filtered by these types of attributes to set priorities.

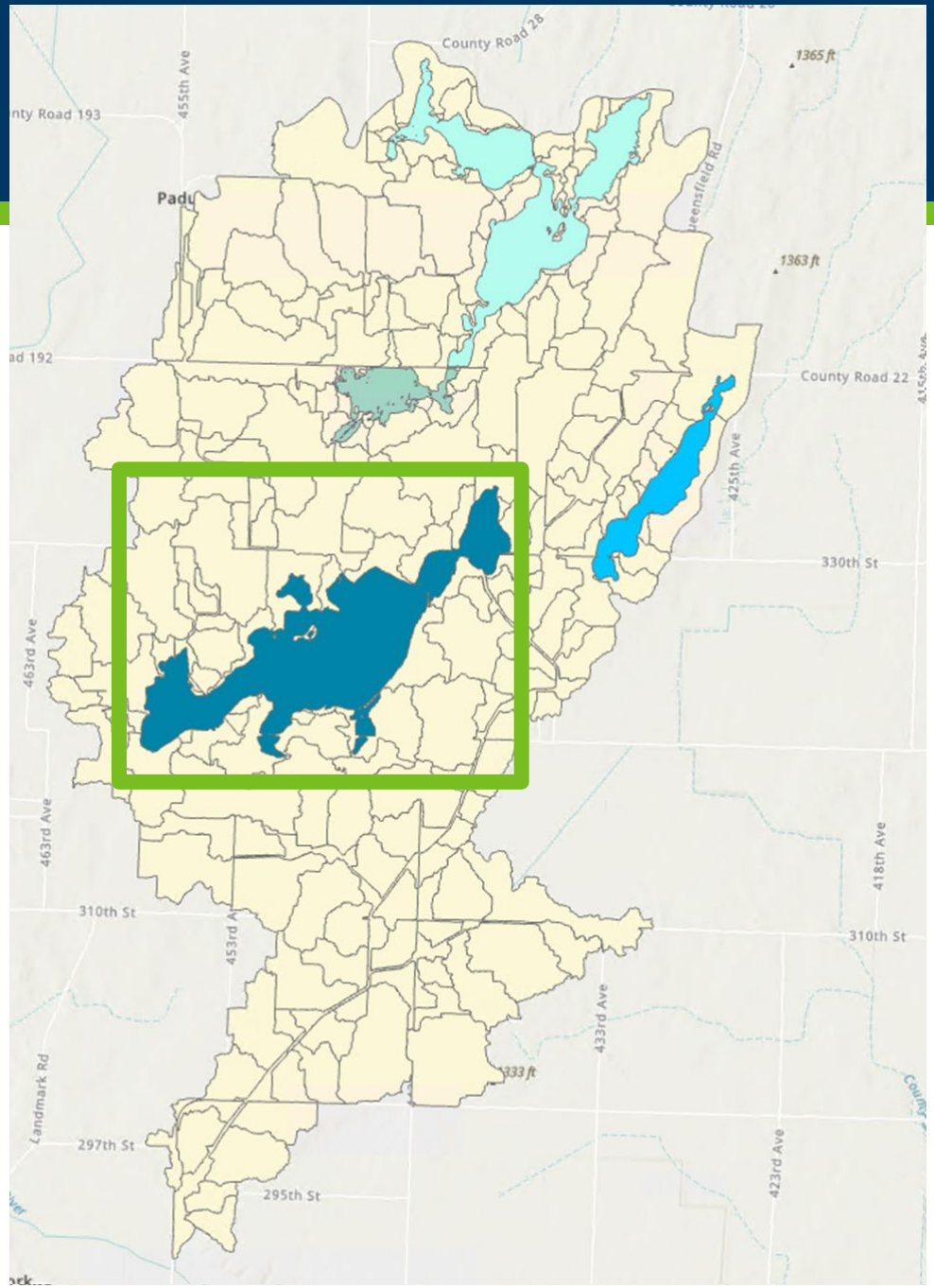
Results - Hydrograph Calculation

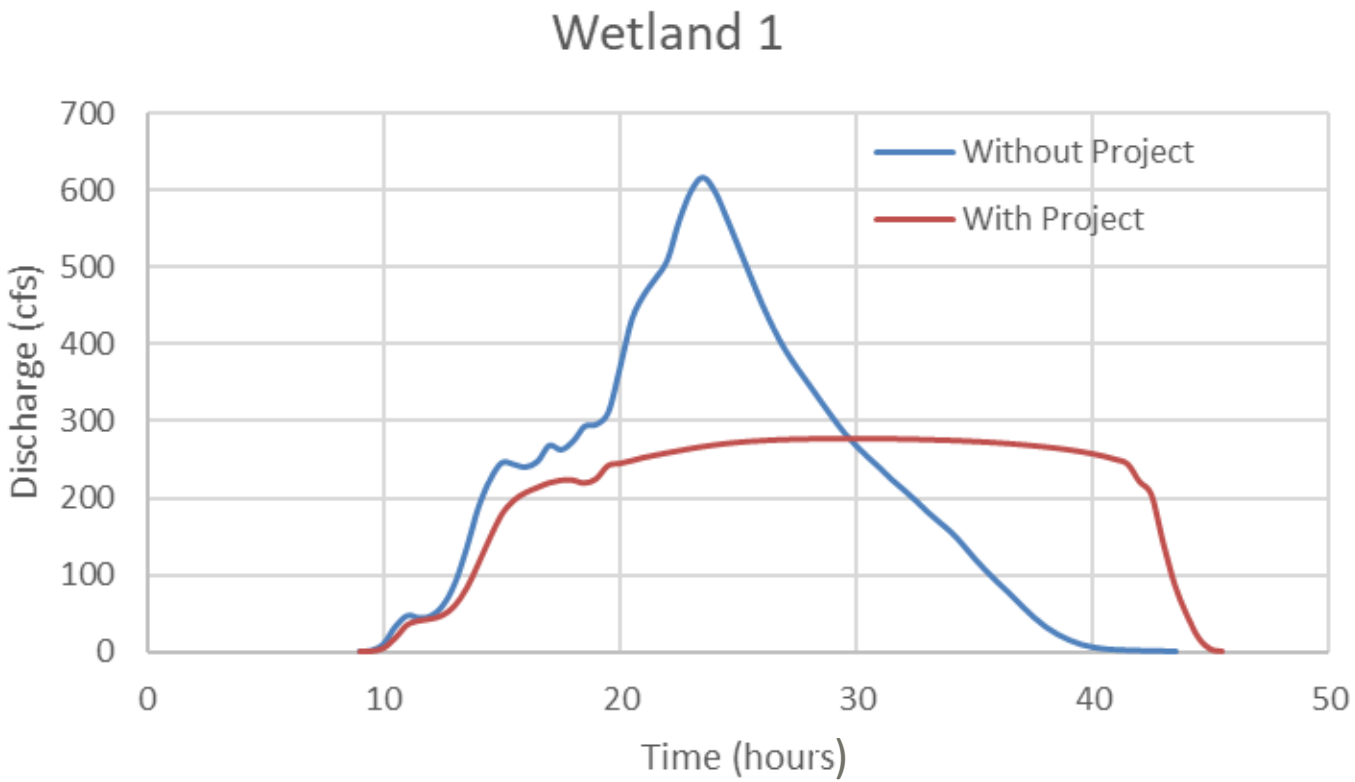


- Hydrographs generated for storage site(s) at priority resource point

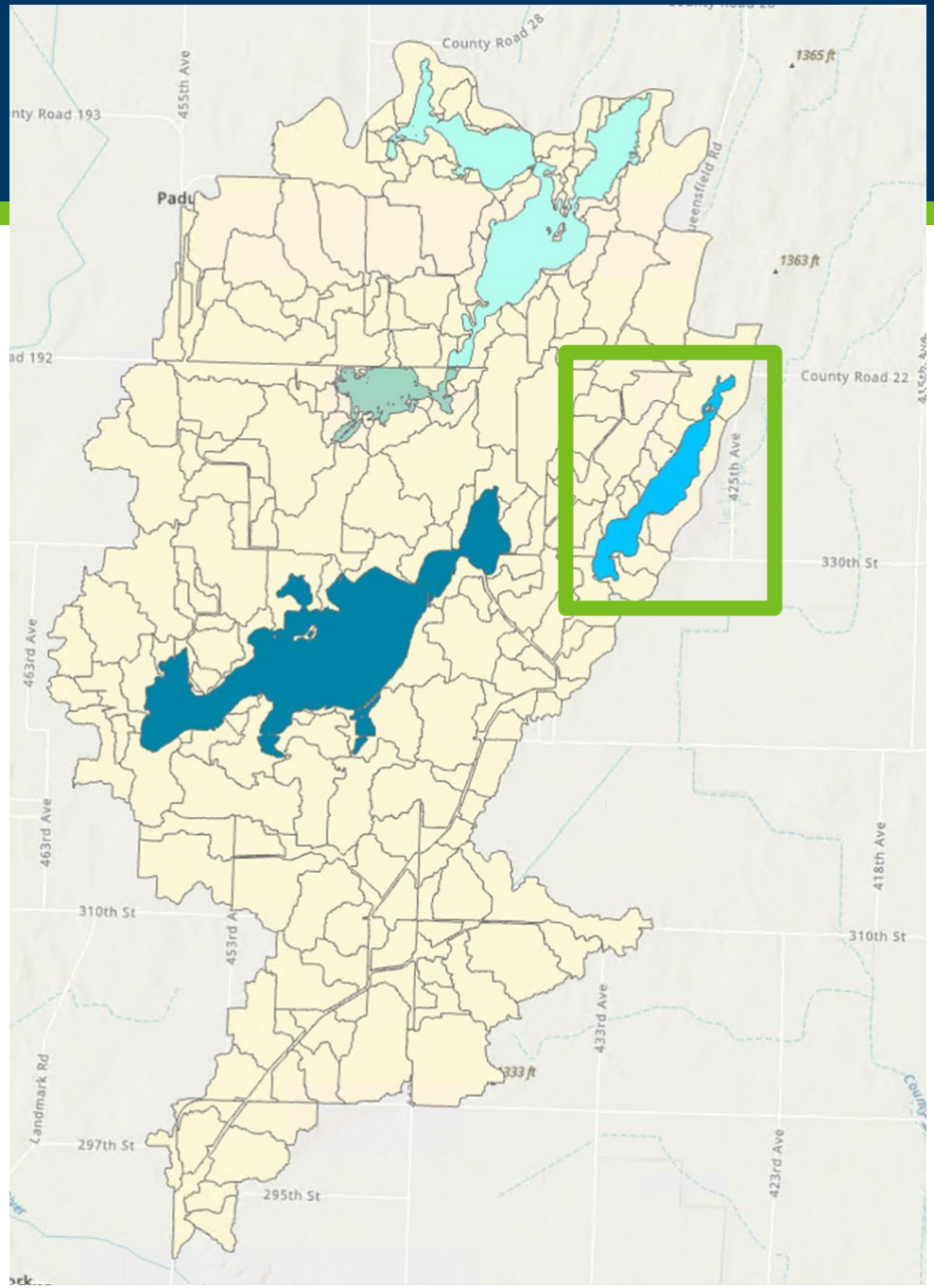


Example 1


County Road 28
1365 ft
455th Ave
Padu
1363 ft
County Road 22
425th Ave
330th St
463rd Ave
310th St
453rd Ave
418th Ave
433rd Ave
Landmark Rd
297th St
295th St
423rd Ave


Wetland 1
Without Project
With Project
Discharge (cfs)
700
600
500
400
300
200
100
0
0
10
20
30
40
50
Time (hours)

Example 2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County Road 22
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418th Ave
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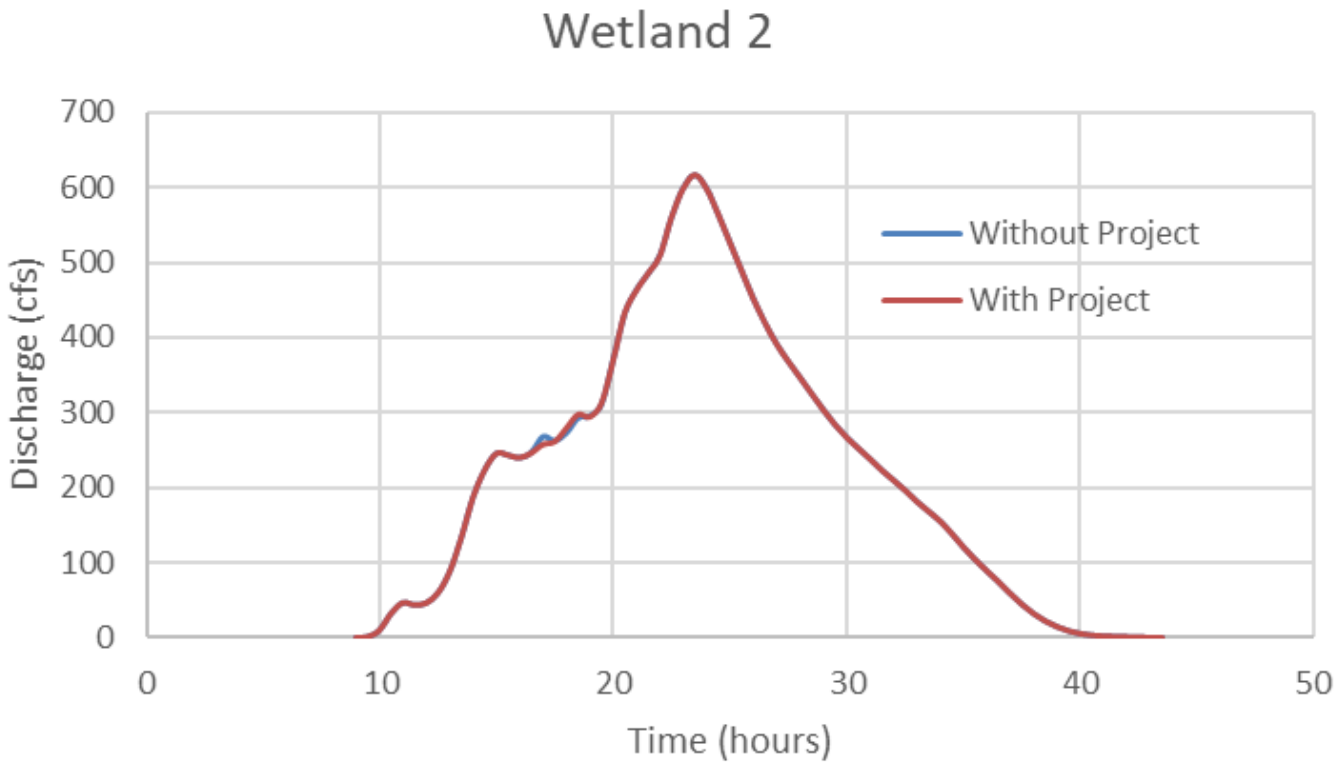
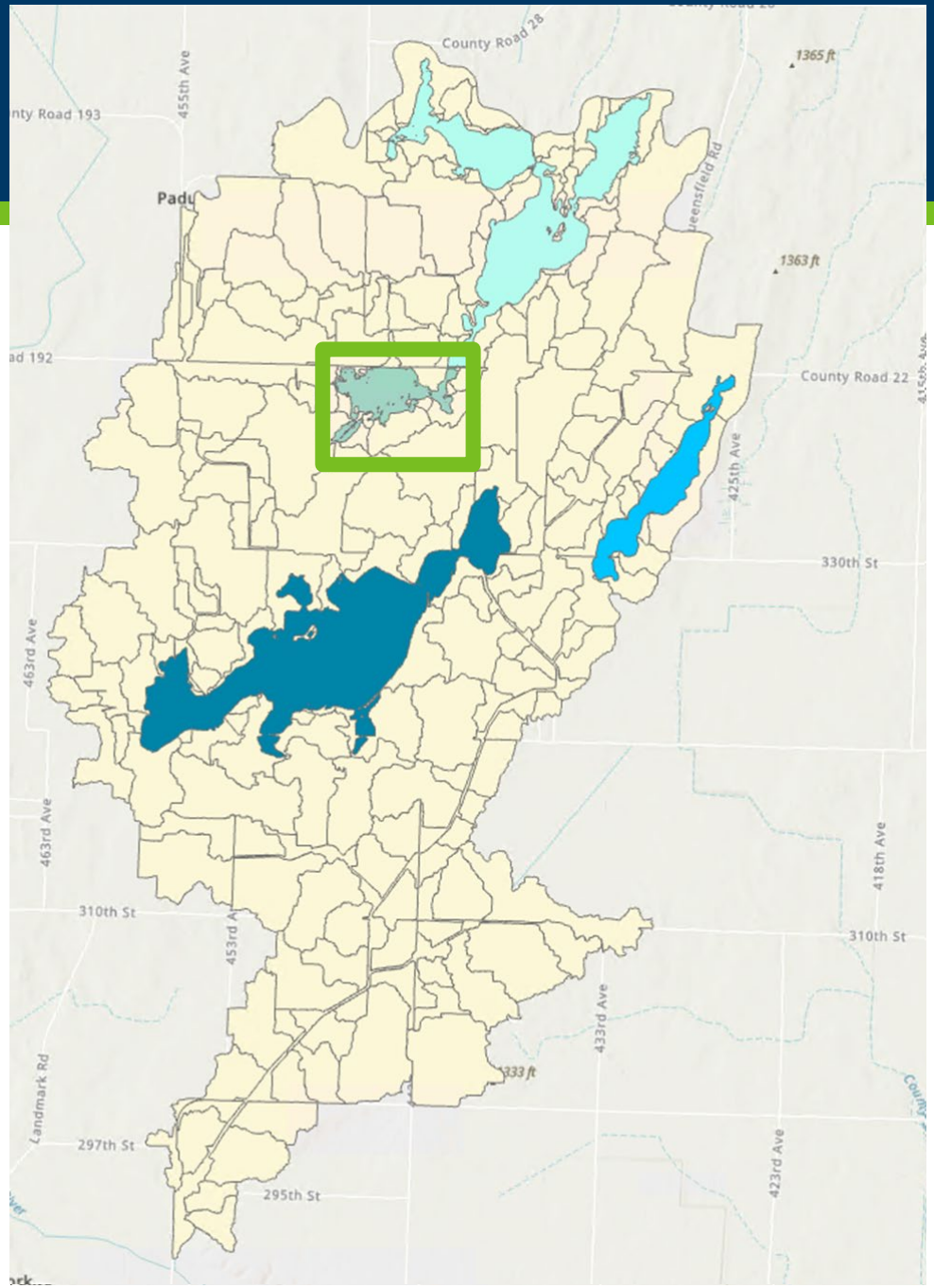
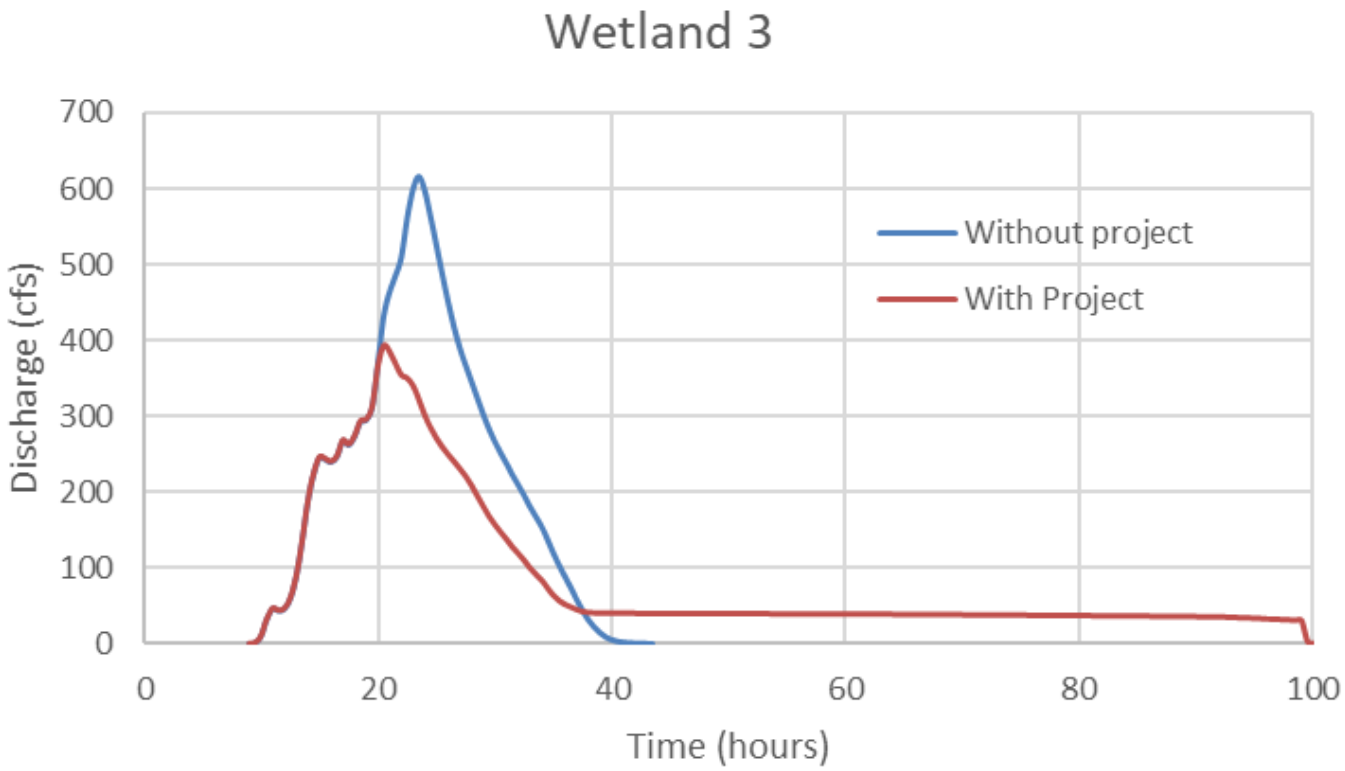
Landmark Rd
297th St
295th St
423rd Ave

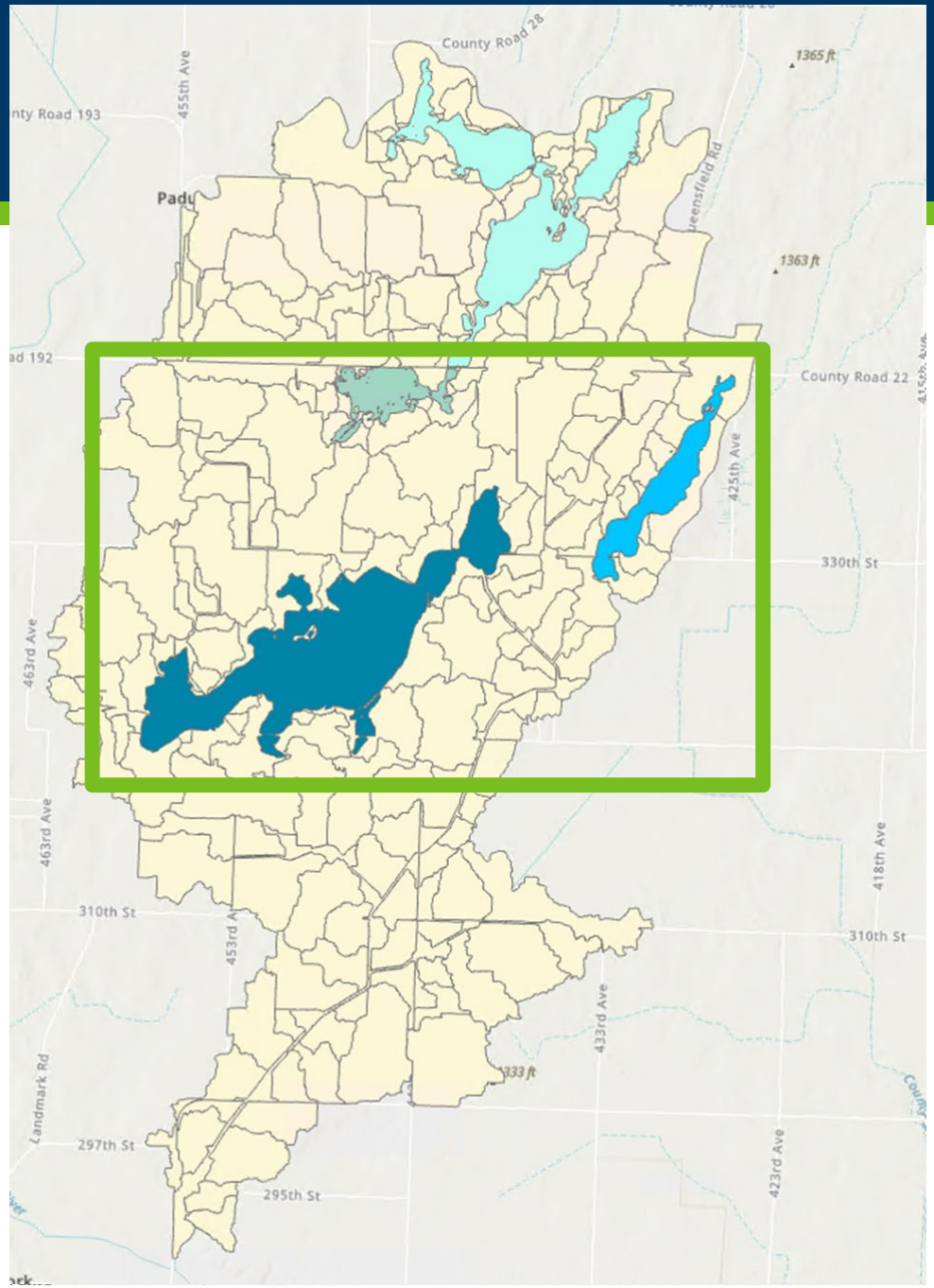

Wetland 2
Discharge (cfs)
700
600
500
400
300
200
100
0
0
10
20
30
40
50
Time (hours)
Without Project
With Project

Example 3


County Road 28
455th Ave
1365 ft
1363 ft
County Road 22
425th Ave
330th St
463rd Ave
310th St
453rd Ave
418th Ave
433rd Ave
423rd Ave
297th St
295th St
Landmark Rd


Wetland 3
Discharge (cfs)
700
600
500
400
300
200
100
0
0
20
40
60
80
100
Time (hours)
Without project
With Project

Example 4


County Road 28
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Landmark Rd
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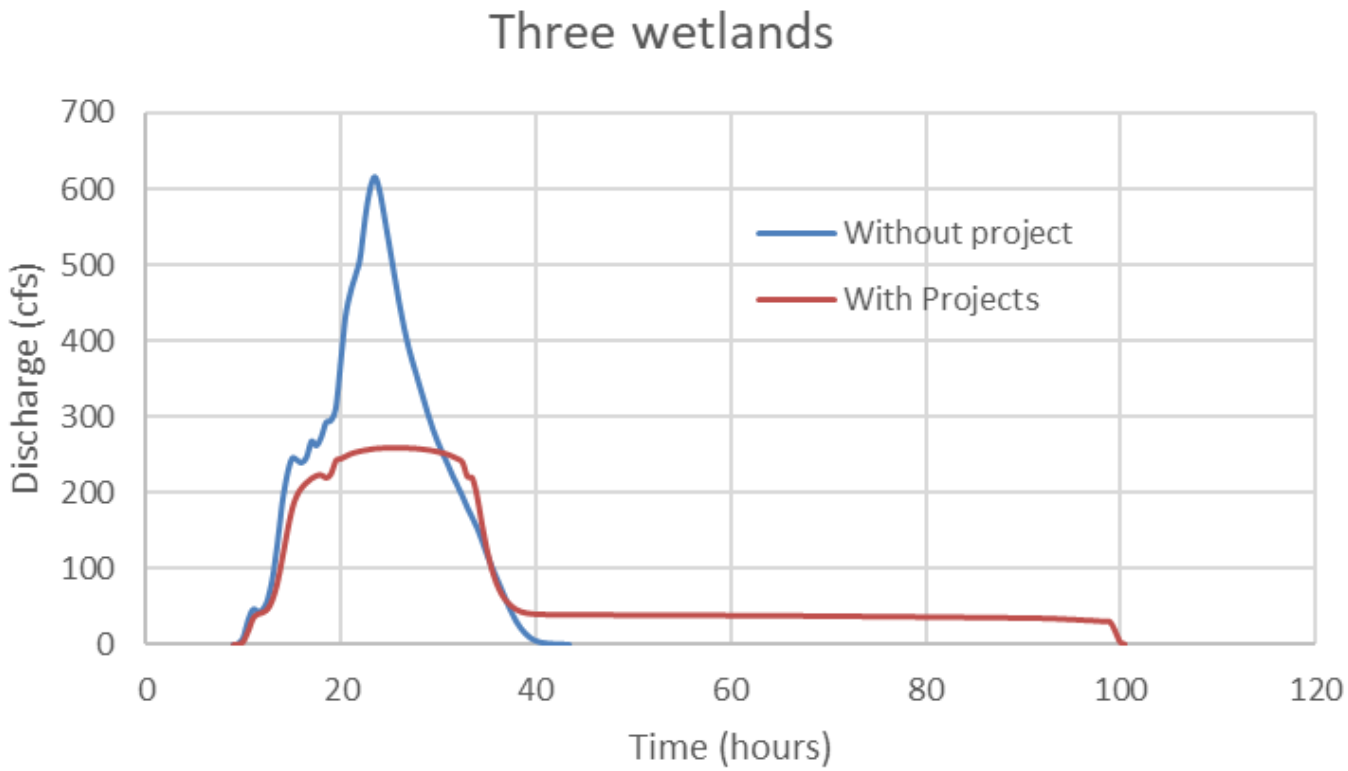
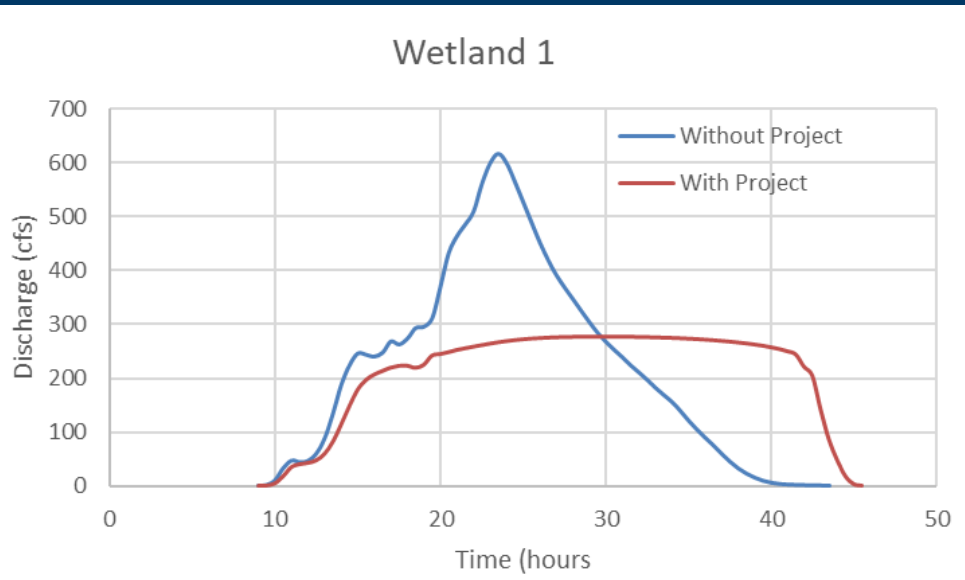
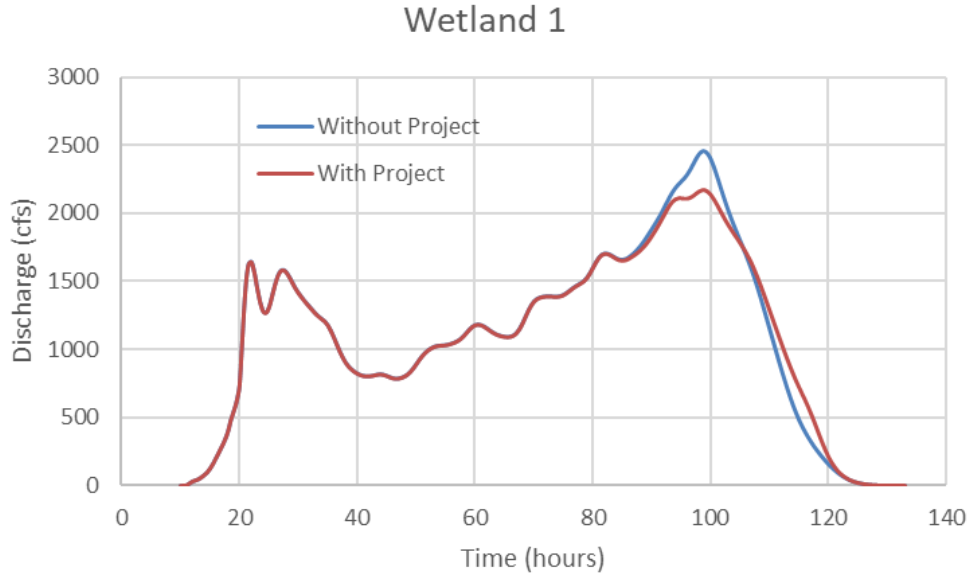

Three wetlands
Discharge (cfs)
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
Time (hours)
Without project
With Projects

Example 5 – Further downstream



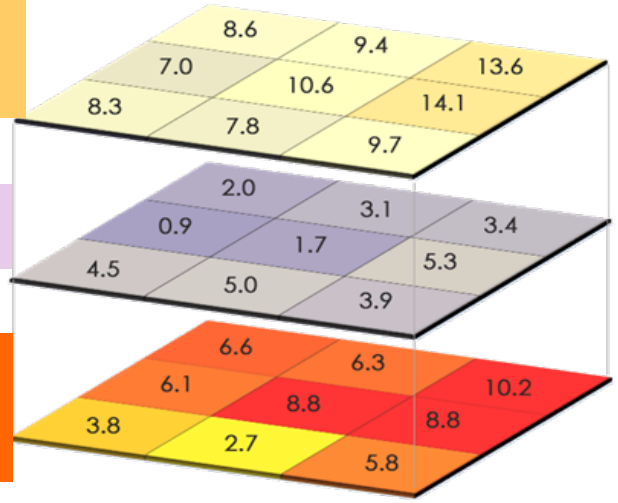


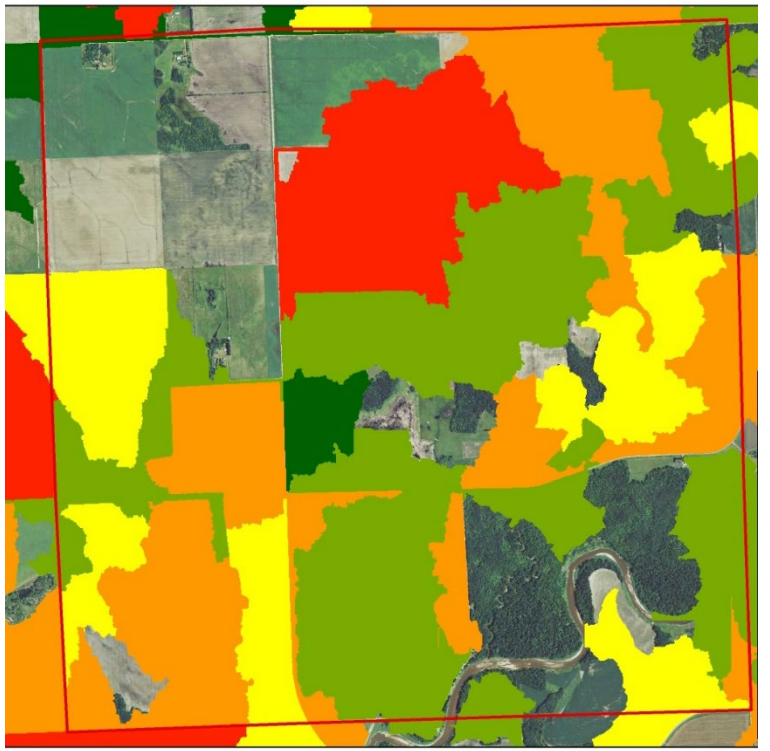
Opens opportunities for multipurpose benefit storage projects

Peak flow/runoff priorities

Habitat priorities

Sediment load priorities





Next Steps and Opportunities

- Use tools in a few more watersheds that are under watershed plan review.
- Provide training for advanced GIS users.
- Derive water storage datasets in watersheds where PTMApp is being updated.
- Work with watershed groups to develop water storage priorities and develop strategies using the framework process.

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Thank You!

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