



Application of SSURGO Soil Attributes to Potential Restorable Wetlands

GeoSpatialServices



ASWM Webinar – Sept. 17, 2014

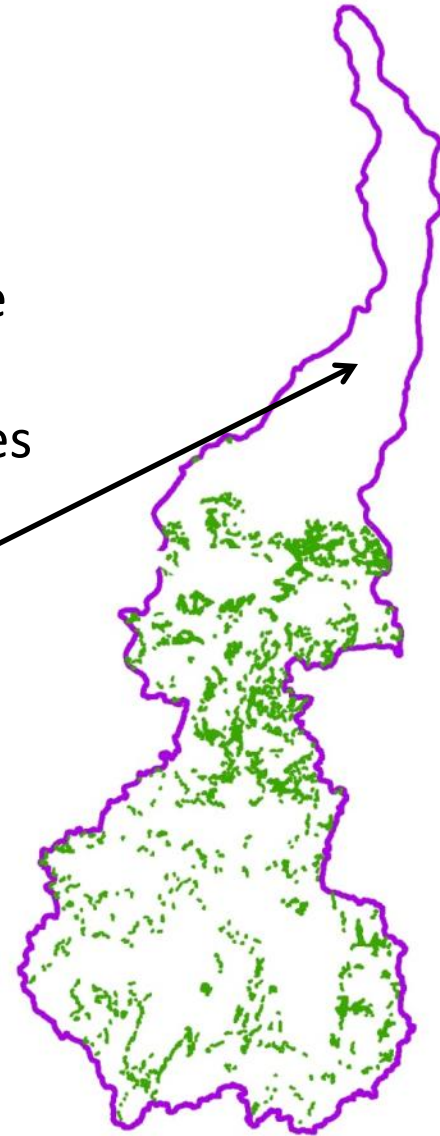
Potential Restorable Wetlands (PRWs):

Working definition: wetland hydrology and soils minus presently mapped wetlands for the re-establishment of wetlands

Hydric Soil Query to find PRWs

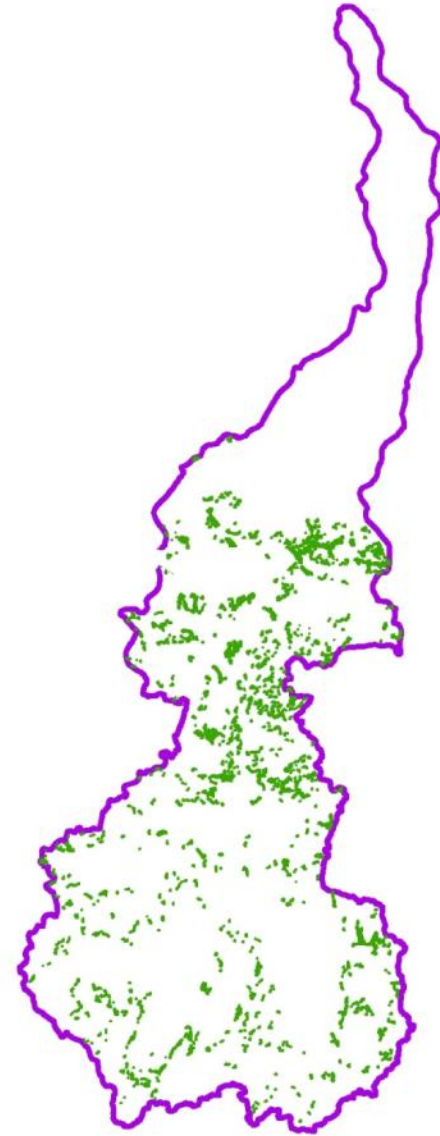
WI DNR PRWs – very few soil map units were identified in the clay plain area of Douglas County (i.e., no PRWs)... yet hundreds of acres of wetland restoration

Lake clay plain area



Remove existing wetlands
(new map product)

Even fewer PRWs w/finer wetland mapping



Potential Wetland Soil Landscapes (PWSL) to find PRWs

Preliminary investigation saw that since soil map units were treated as complexes; combines multiple components into one map unit (e.g., 40/30/30) this also was initially informative for finding PWSL

Map units representing soil complexes = not spatially explicit enough (i.e., too generalized)

Is there a different method? more information?

Simplified PRW GIS Model

$$\text{PRW} = (\text{A} + \text{B}) - \text{W}$$

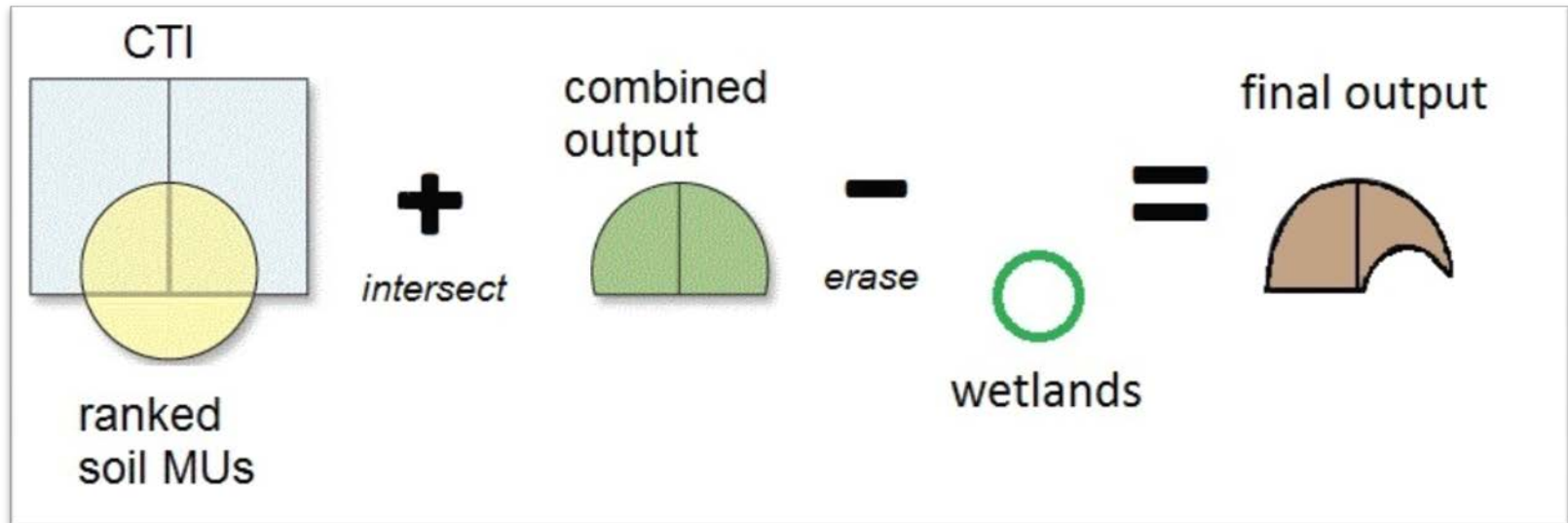
A = CTI values > 9.5* (*raster cells*)

B = ranked soil map units (*polygons*)

W = current wetland boundaries (*polygons*)

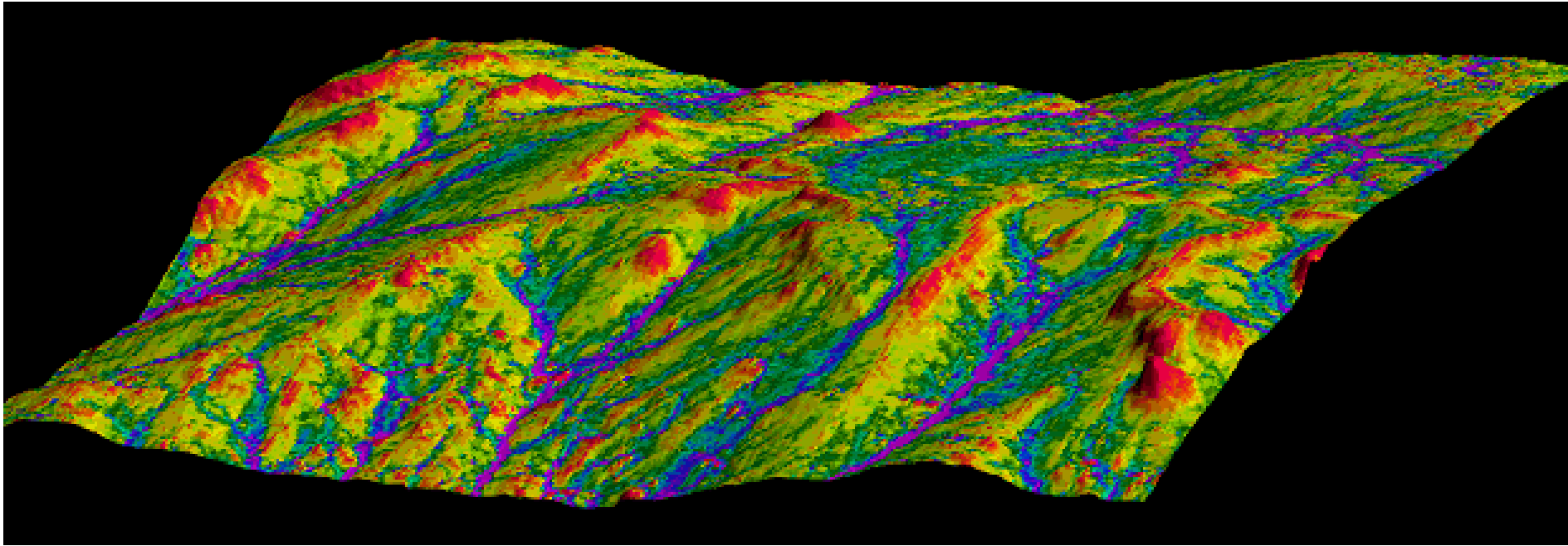
+ = Intersect ArcGIS tool

- = Erase ArcGIS tool



Primary GIS data layers:

- Compound Topographic Index (CTI) Layer
 - represents “soil wetness”; a function of the slope and the upstream contributing area per unit width orthogonal to the flow direction.
 - created using ArcGIS Tools from a 10 meter DEM
 - reclassified into values of interest (>9.5)
 - convert cells to polygons for overlay analysis

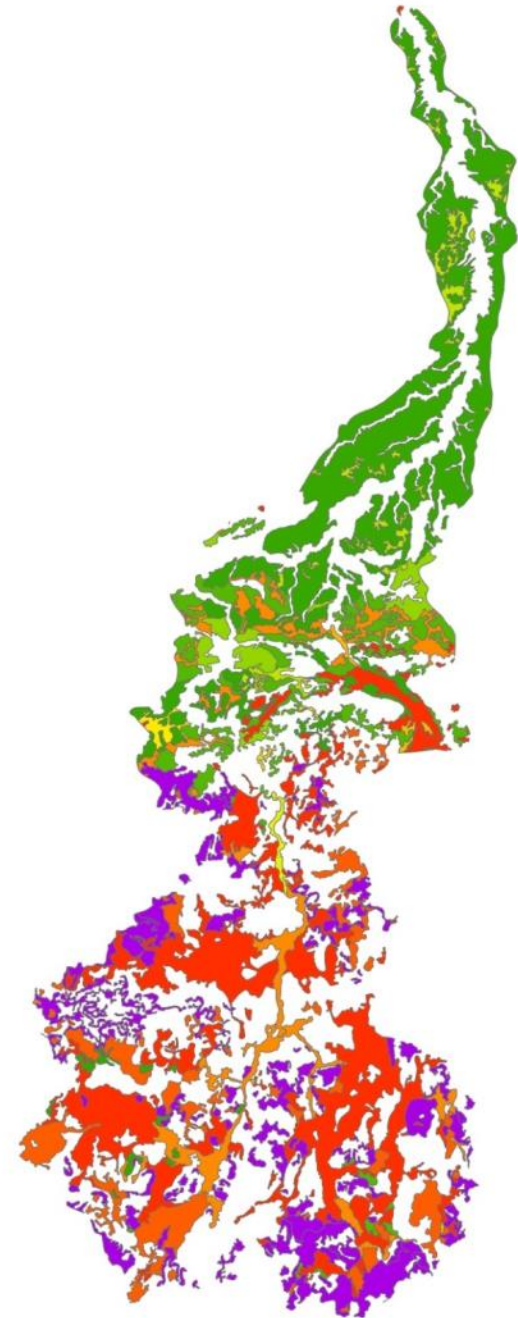


Primary GIS data layers ...continued

- Soil Water Regime Rank Layer

- A ranking of soil map units based on characteristics contained in each MU description. It is intended to indicate a relative potential for a given soil map unit to support wetlands.
- Only MUs containing at least one major component with a drainage class of somewhat poorly drained or wetter.
- Completed by carefully examining the descriptions of MUs in the study area.

Note: Areas with a complex mixture of drainage classes were given a rank of 999 to indicate separate consideration. (i.e., unclear – field verification required)



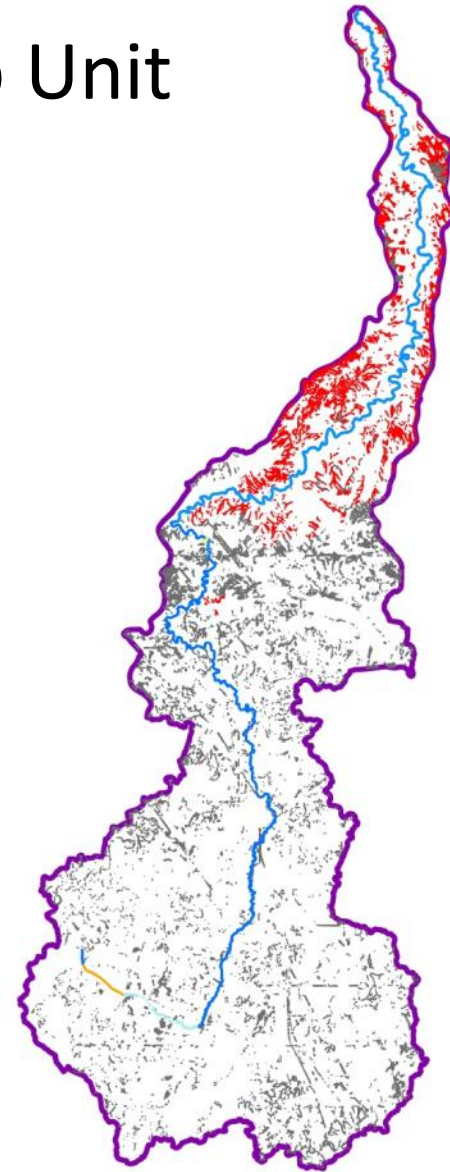
Map Unit Symbol	Name	Percent Slopes	Drainage class	Important Hydrologic Notes	Ranking
3A	Totagatic (30-60%)- Bowstring (15-60%) -Ausable (15-40%) Complex	0-2	Poorly drained / very poorly drained / very poorly drained	Frequently flooded,	18
5A	Arnheim mucky silt loam (80-100%)	0-1	Poorly drained	Frequently flooded	16
6A	Moquah fine sandy loam (90-100%)	0-3	Moderately well drained	Floodplain/riparian wetlands	5
577A	Lerch (40-65%) – Borea (20-50%) complex	0-3	Poorly drained / somewhat poorly drained	Shallowest depth to wet zone: at surface jan, Fb, Mar, Apl, May, Jun, Oct, Nov, Dec / shallowest depth to wet zone: 0.5 ft (Jan, feb, mar, Apl, May, Oct)	12
579B	Parkfalls sandy loam (75-100%)	0-4	Somewhat poorly drained	Very stony, shallowest depth to wet zone 0.5 ft (April)	9
623A	Capitola muck (60- 100%)	0-2	Very poorly drained	Shallowest depth to wet zone: at the surface (April, May, Nov)	18
654A	Pesabic (25-70%) – Newood (15-60%) – Capitola (10-50%) complex	0-1	Somewhat poorly drained / moderately well drained / very poorly drained	Shallowest depth to wet zone: 0.5 ft (April, May) / shallowest depth to wet zone: 2.5 ft (April, May, Nov) / shallowest depth to wet zone: at surface (April, May, Nov)	999

The Primary “Hydric” Soil Map Unit in the Clay Plain Area :

Amnicon-Cuttre complex (262B)

(PRW polygons within this soil map unit
are shown here in red)

Note: These are in the area most of the
agriculture is found and therefore ditches are
visible in aerial photography.



Amnicon-Cuttre Complex

Amnicon (**40-60% of map unit**)

- Geomorphic setting: Till plains
- Slope range: 0 to 4 percent
- Depth to restrictive feature: Very deep (more than 60 inches)
- Drainage class: **Moderately well drained**
- Parent material: Clayey till
- Flooding: None
- Shallowest depth to wet zone: 1.0 foot (April, May, November)
- Deepest depth to wet zone: More than 6.7 feet (January, February, March, June, July, August, September, October, December)
- Ponding: None

Amnicon-Cuttre Complex ...continued

Cuttre and similar soils (30-50% of map unit)

- Geomorphic setting: Till plains
- Slope range: 0 to 3 percent
- Depth to restrictive feature: Very deep (more than 60 inches)
- Drainage class: **Somewhat poorly drained**
- Douglas County, Wisconsin 41
- Parent material: Clayey till
- Flooding: None
- Shallowest depth to wet zone: 0.5 foot (January, February, March, April, May, October, November, December)
- Deepest depth to wet zone: More than 6.7 feet (June, July, August, September)
- Ponding: None

Primary Observations

- Most of the high CTI values occur in deep ravines or “floodplains” of larger streams and rivers
 - Not likely “viable” PRWs in this study area.
- High Soil Water Regime Ranks do not occur in the low portions of the watershed (i.e., in the clay plain).
 - Are we after the moderate and low CTIs and Soil Ranks?
- Most PRWs occurring in forested areas are likely the result of:
 - Wetlands being under-mapped in areas; OR
 - Mapping discrepancies occur because of scale (large raster cells or wetlands too small to map)
- Complex Map Units (999) – dealt with separately may require field work

Results of PRW model

Resultant GIS layer is unfiltered;

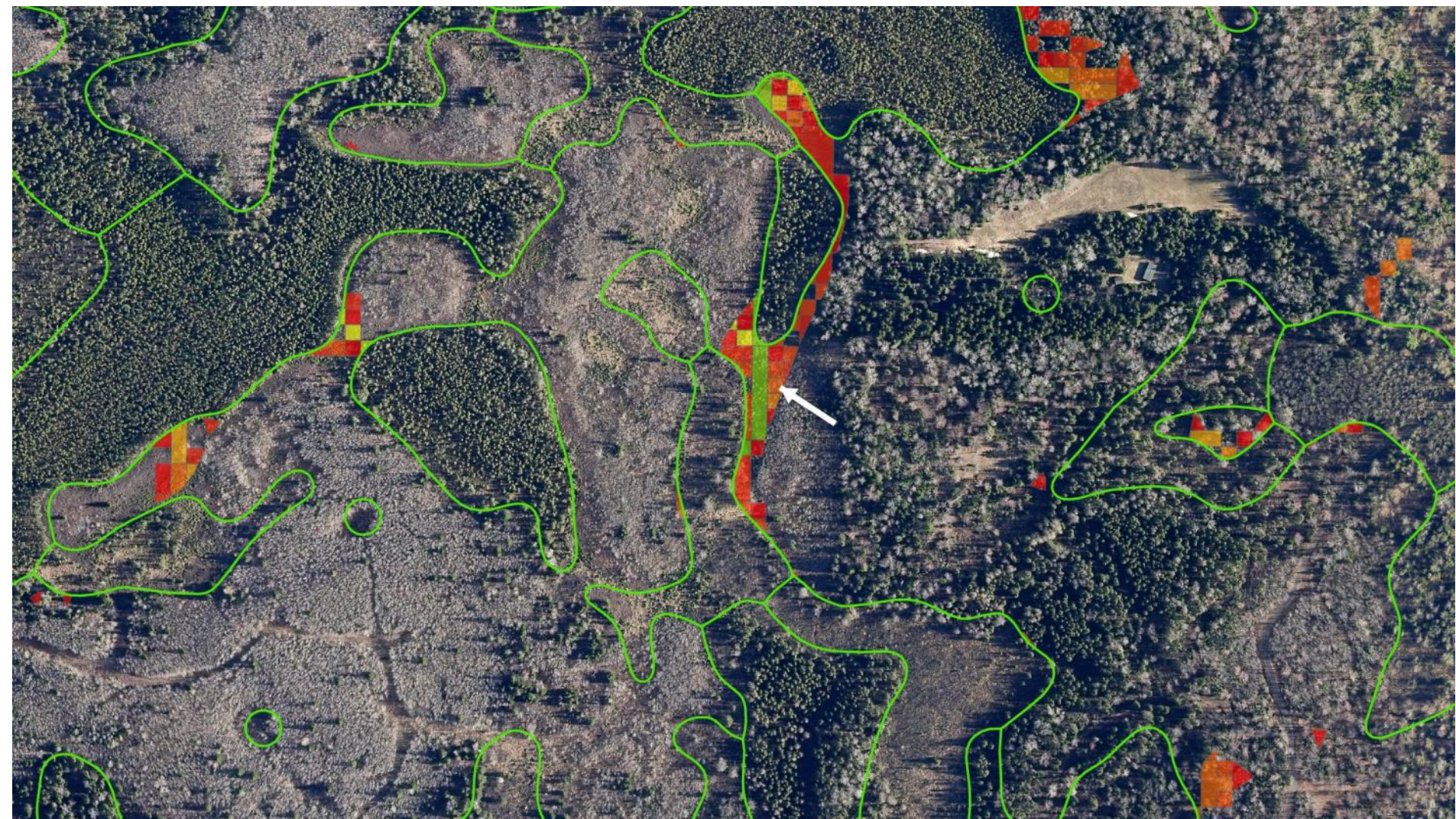
contains thousands of individual polygons, many of which are “noise”

- not particularly useful

Requires further investigation (photo interpretation)

- Larger polygons examined to find representative point;
- areas immediately “upstream” of these points are to be considered potential wetland restoration areas.

“under-mapping”



Interpretation of PRWs is required to reduce superfluous results.

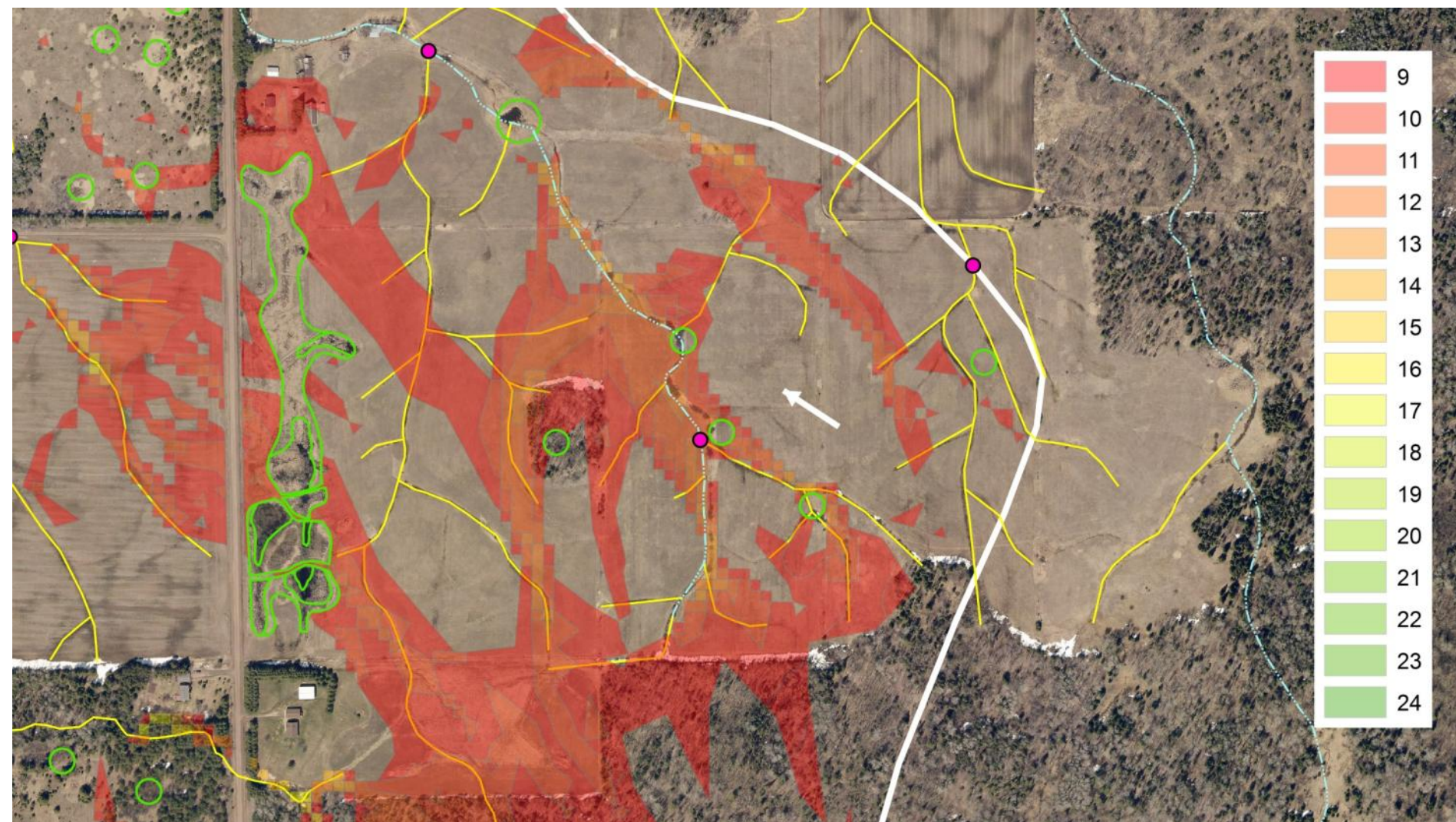
- Visible ditching acts as evidence of altered hydrology and therefore some level of reduced or altered wetland area.
- If these visible ditches also occur in areas with high CTI values and soils with drainage classes of “somewhat poorly drained” or wetter, then another piece of evidence could act to set the area apart in terms of narrowing the long list of PRW polygons.

Evidence hydrologic alteration straightened flow paths or ditches in ag fields

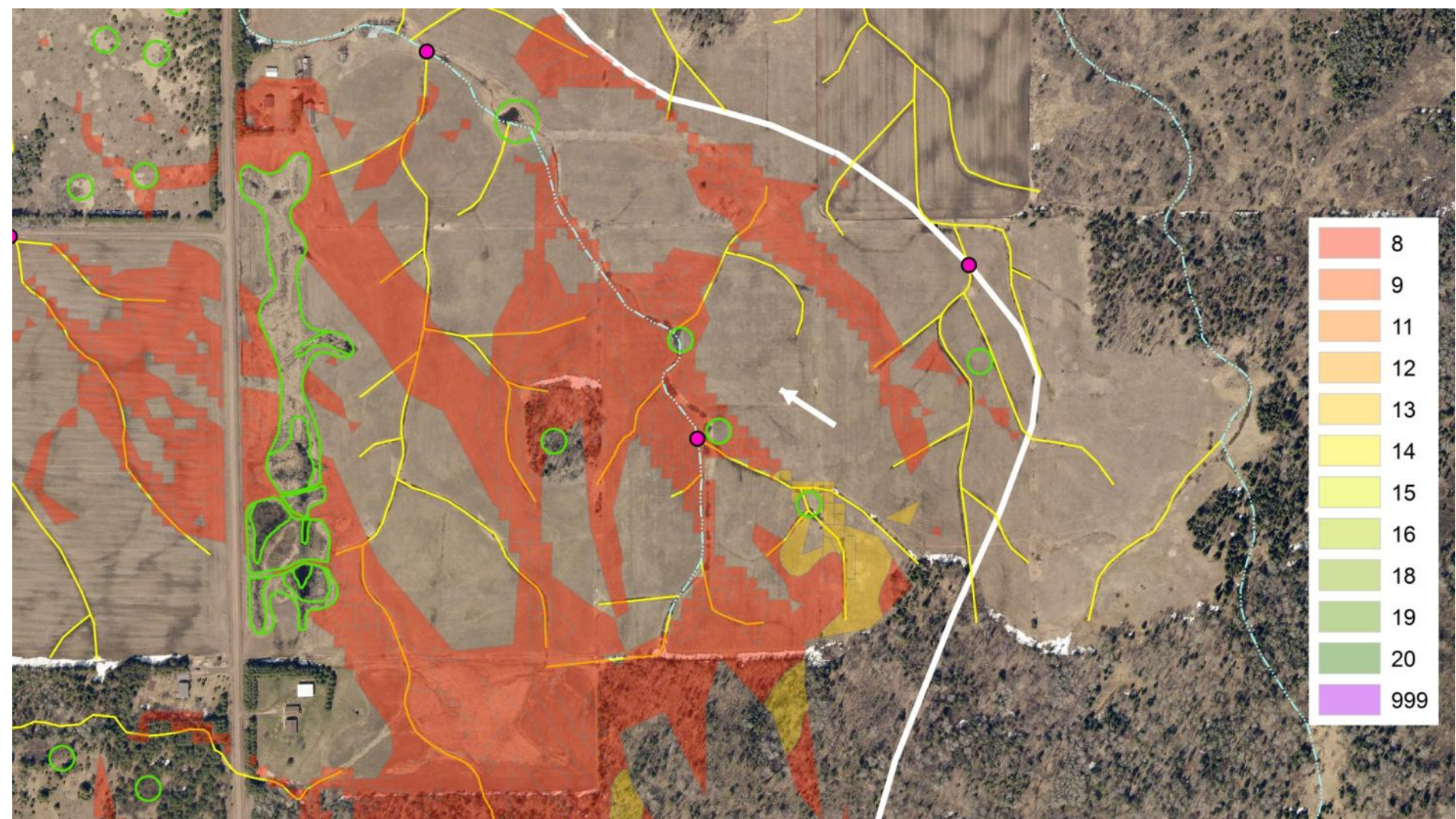
- Ditches & Even Intermittent Streams
 - Features were photo-interpreted and digitized



CTI + Soil Rank Output (CTI values)



CTI + Soil Rank Output (soil ranks)



Final PRW Outputs:

Interpreted PRW locations (points) – these are selected with the intention to act as pour points of an upstream area where wetlands might be restored. (requires field verification)

Interpreted PRW areas (polygons) – polygons based on open lands analysis polygons for areas immediately “upstream” of each of the identified points. (requires field verification)

Potential Riparian Buffer Improvement

Stream Segments (lines) – these copied and split segments of the DNR hydro layer that are interpreted as having little or no woody riparian vegetation. In some cases these areas might be affected by active grazing of livestock. These features are intended to be used to understand riparian buffer and possible cattle exclusion opportunities that may fall into wetland restoration and fall in line with slow the flow priorities. (requires field verification)

Additional Filters/Criteria to Narrow PRW List?

- Open lands analysis data?
 - How to use this in a filtering process
- Sociological?
 - Many different possibilities