Status & Trends of Wetlands in Minnesota: Minnesota Wetland Condition Assessment (2011-2021)

MINNESOTA POLLUTION CONTROL AGENCY

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NAWM webinar – NWCA fed & state perspectives

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Why a wetland quality survey?

- Wetlands cover more of Minnesota than lakes and streams
- Achieve no-net-loss in the quantity, quality, and biological diversity of Minnesota's wetlands
- Wetlands are waters of the state
- Probabilistic monitoring is the most cost-effective approach to determine whether we are meeting the no-net-loss goal

Why vegetation quality?

- Almost all wetlands have hydrophytic vegetation
- Large majority of wetlands lack surface water for much of the growing season
- Vegetation quality indicators are the most advanced group for wetlands

What do we know?

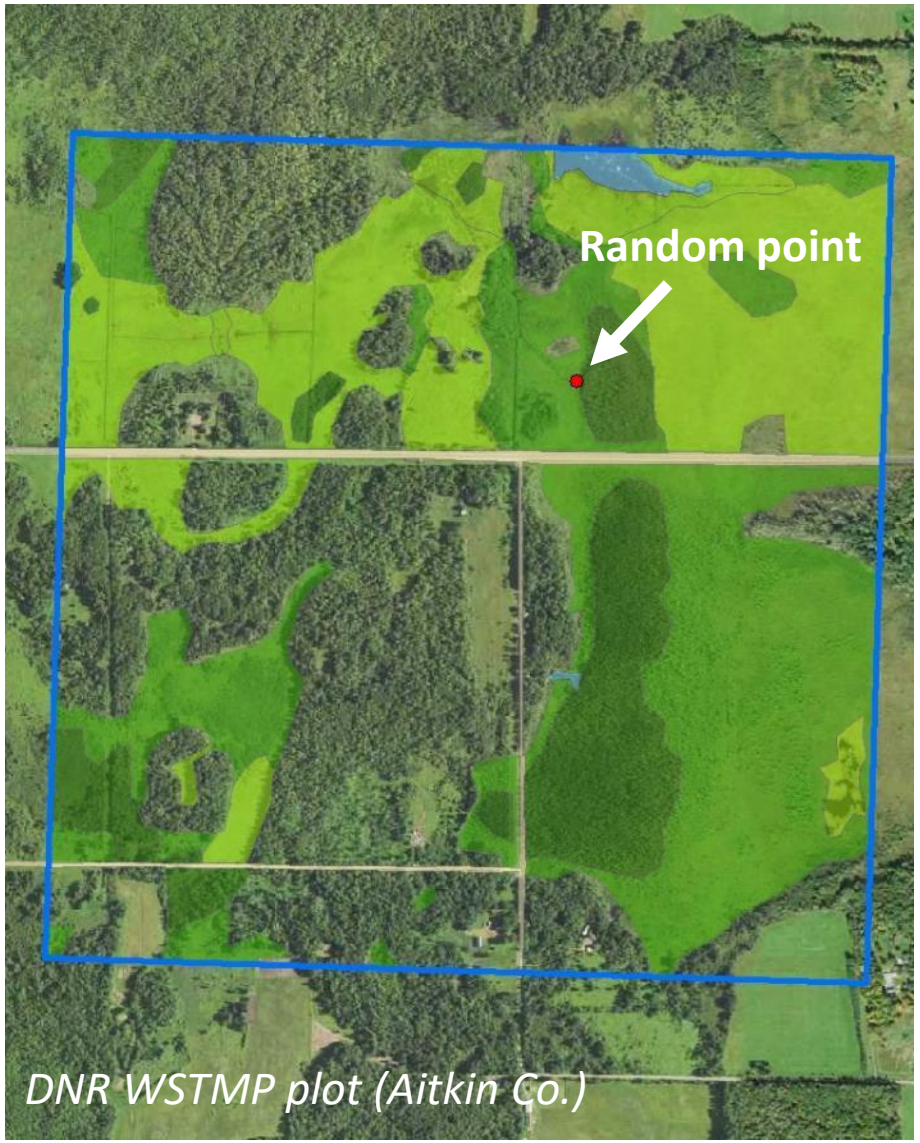
Minnesota Wetland Condition Assessment (MWCA) 2011-2016

- Most of Minnesota's wetlands have intact vegetation
- Veg quality varies greatly by region
- Corresponds to the regional extent and stressor patterns
- Non-native invasive veg are having the greatest level of wetland vegetation quality impact
- Some differences detected between 2011-16 but likely due to sample/random error

Site-establishment in a depressional basin (Douglas Co.)

How are we doing the survey?

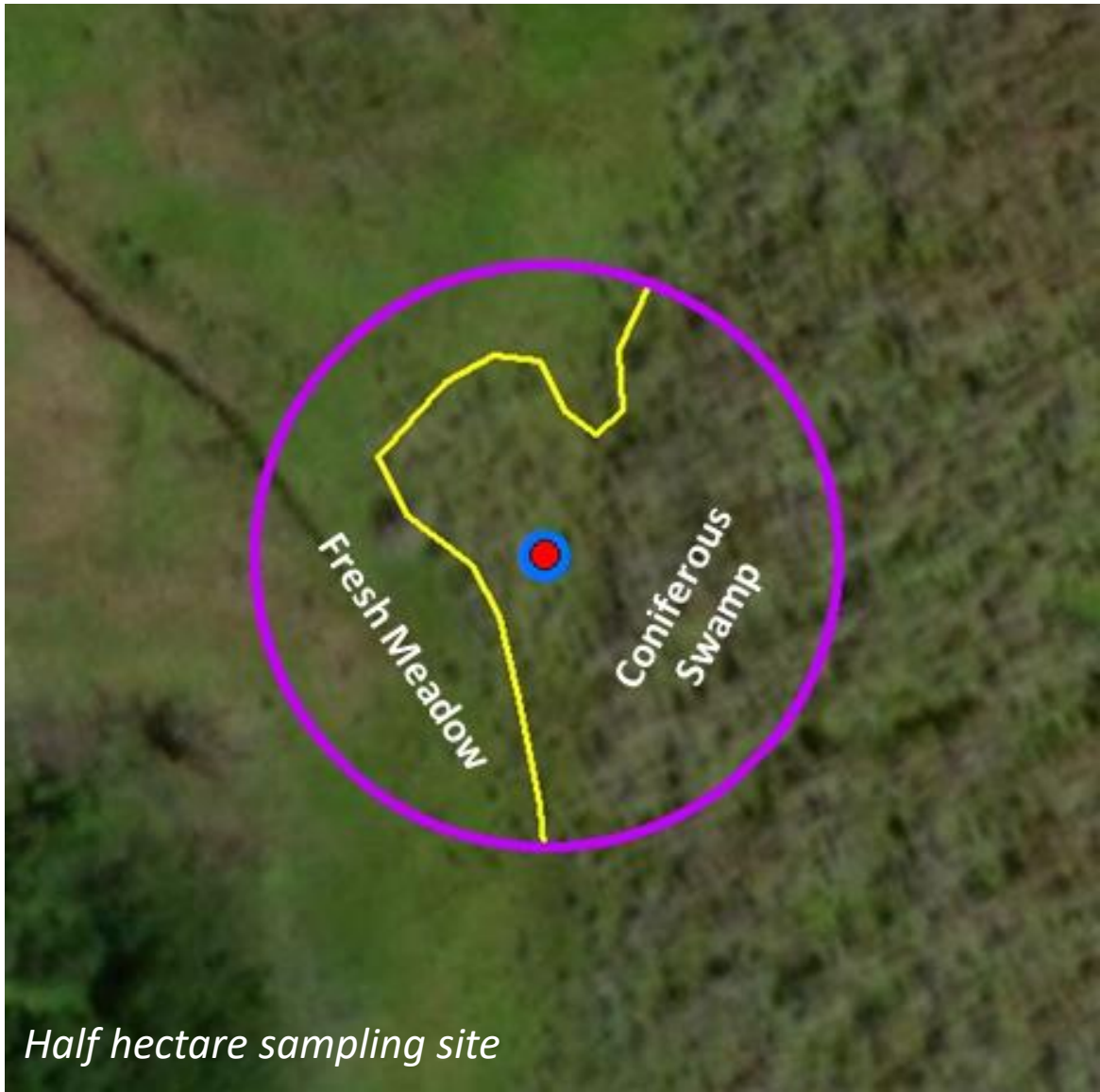
- Intensification of EPA's National Wetland Condition Assessment (NWCA)
- 5-year sampling cycle (sampling iterations 2011, 16, 21)
- Target pop = non-cultivated wetlands w/< 1m of surface water
- Sample frame = MN DNR Wetland Status & Trends Monitoring Program (WSTMP)
- Target sample = 150 sites @ 50/ecoregion & 50% revisit rate (national sites integrated)



DNR WSTMP plot (Aitkin Co.)

How are we doing the survey?

- Vegetation condition is the primary indicator (Floristic Quality Assessment)
- Vegetation surveys: ID species/cover estimates/community type
- Sampling occurred over 2021-23 (referred as “2021” for simplicity)
- Stressor observations during site-visit and desktop
- Condition & stressor estimates by state/region/wetland type (with a margin of error)



Half hectare sampling site

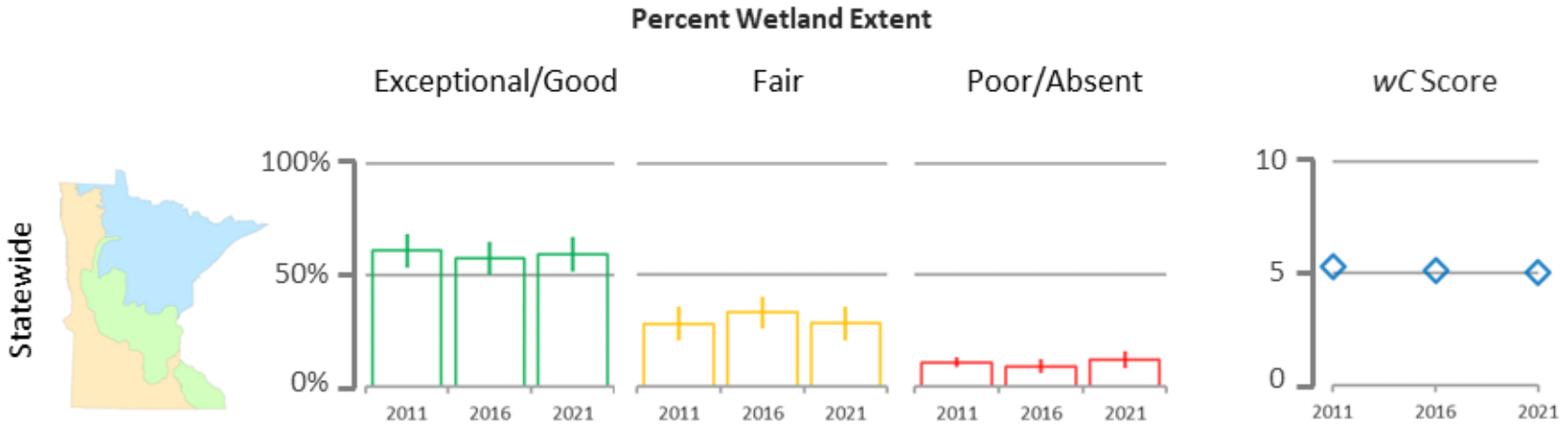
Wetland veg condition categories

Condition Category	Description
Exceptional/Good	Composition/structure completely intact – minor changes
Fair	Moderate composition/structure changes
Poor/Absent	Large-extreme changes in composition/structure – devoid of living wetland vegetation

Native shallow marsh community – good condition (Polk Co.)

Shallow marsh overrun by narrow-leaved cattail – poor condition (Marshall Co.)

Statewide wetland veg quality change (2011-2021)



Overall pattern holds

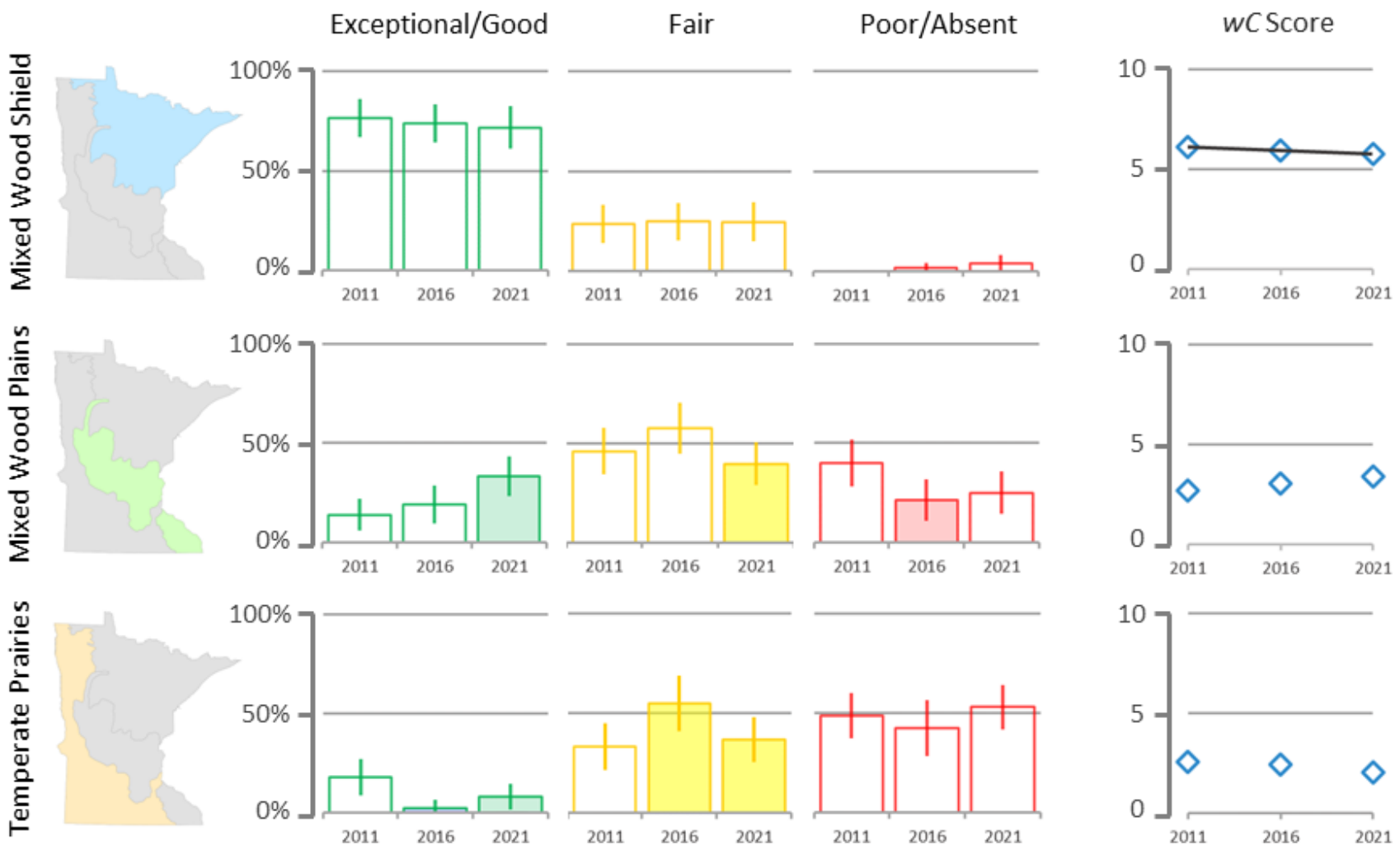
Ways to look at change

- Condition category estimates between year pairs
- *wC* sample means between year pairs
- *wC* trend analysis

What are we seeing?

- No significant difference ($P > 0.05$) between estimate or *wC* year pairs
- No significant *wC* trend

Regional wetland veg quality change (2011-2021)



Regional pattern holds

Mixed Wood Shield

- Significant downward *wC* trend
- No year pair changes (extent estimates or *wC*)

Mixed Wood Plains & Temperate Prairies

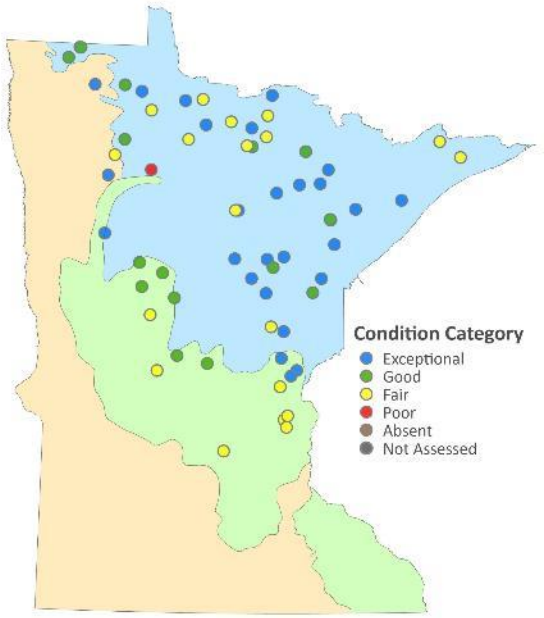
- Some significant year-pair extent estimate differences
- No corresponding significant *wC* year-pair differences
- No corresponding significant *wC* trend

Sampling/random error most likely explanation

Hydrogeomorphic class estimates

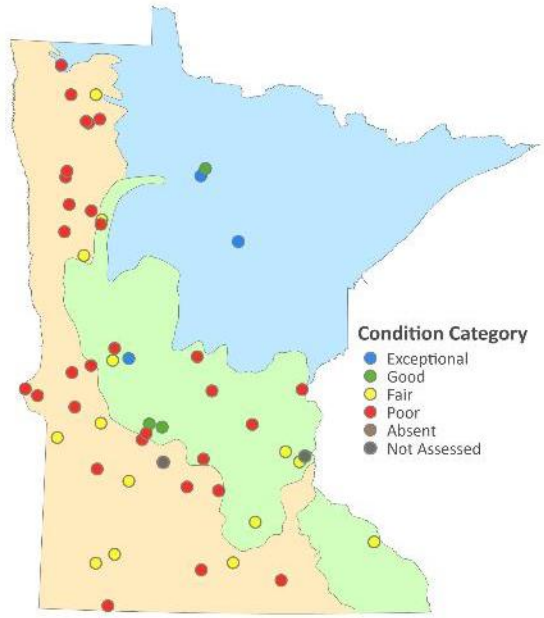
Organic Soil Flat wetlands

- Precipitation driven
- 66% wetland extent statewide
- More prevalent in the Mixed Wood Shield (82%)
- 71% exceptional/ good veg quality (statewide and MWS)



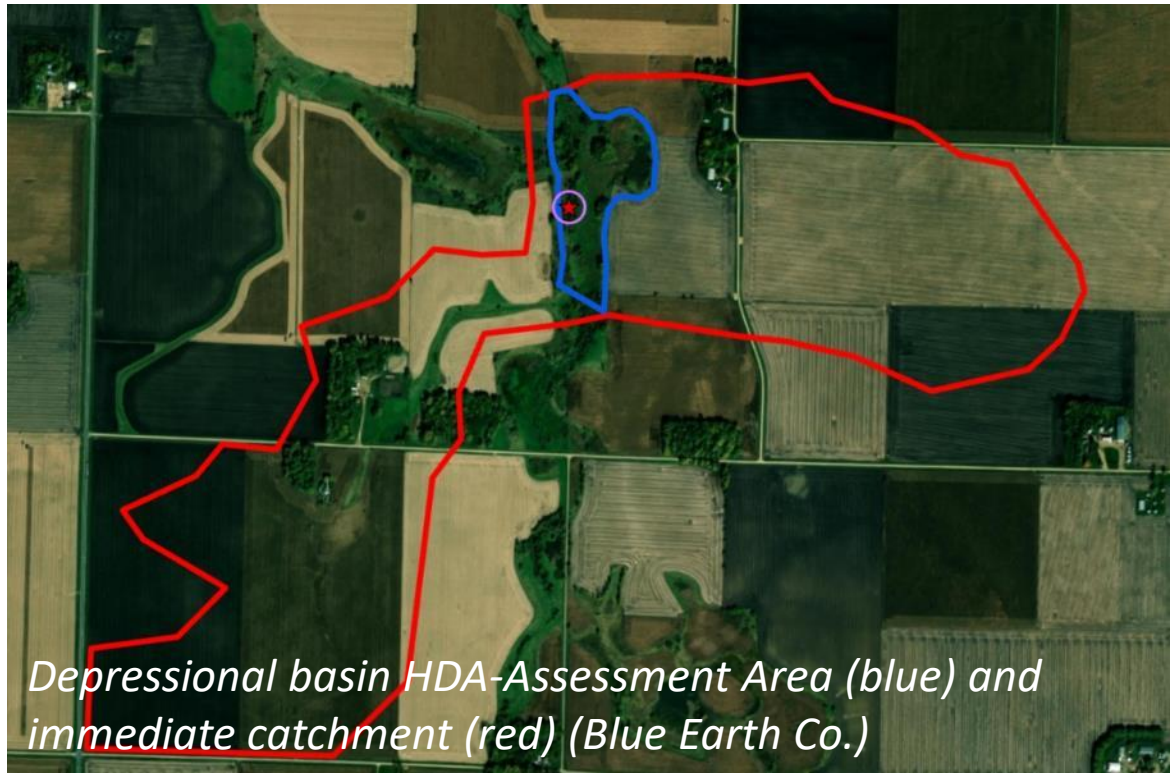
Depressional wetlands

- Variety of water sources
- Basins have catchments
- 18% wetland extent statewide
- More prevalent in the Mixed Wood Plains (38%) and Temperate Prairies (63%)
- Associated with degraded veg quality (68% statewide, 78% MWP, 97% TP)



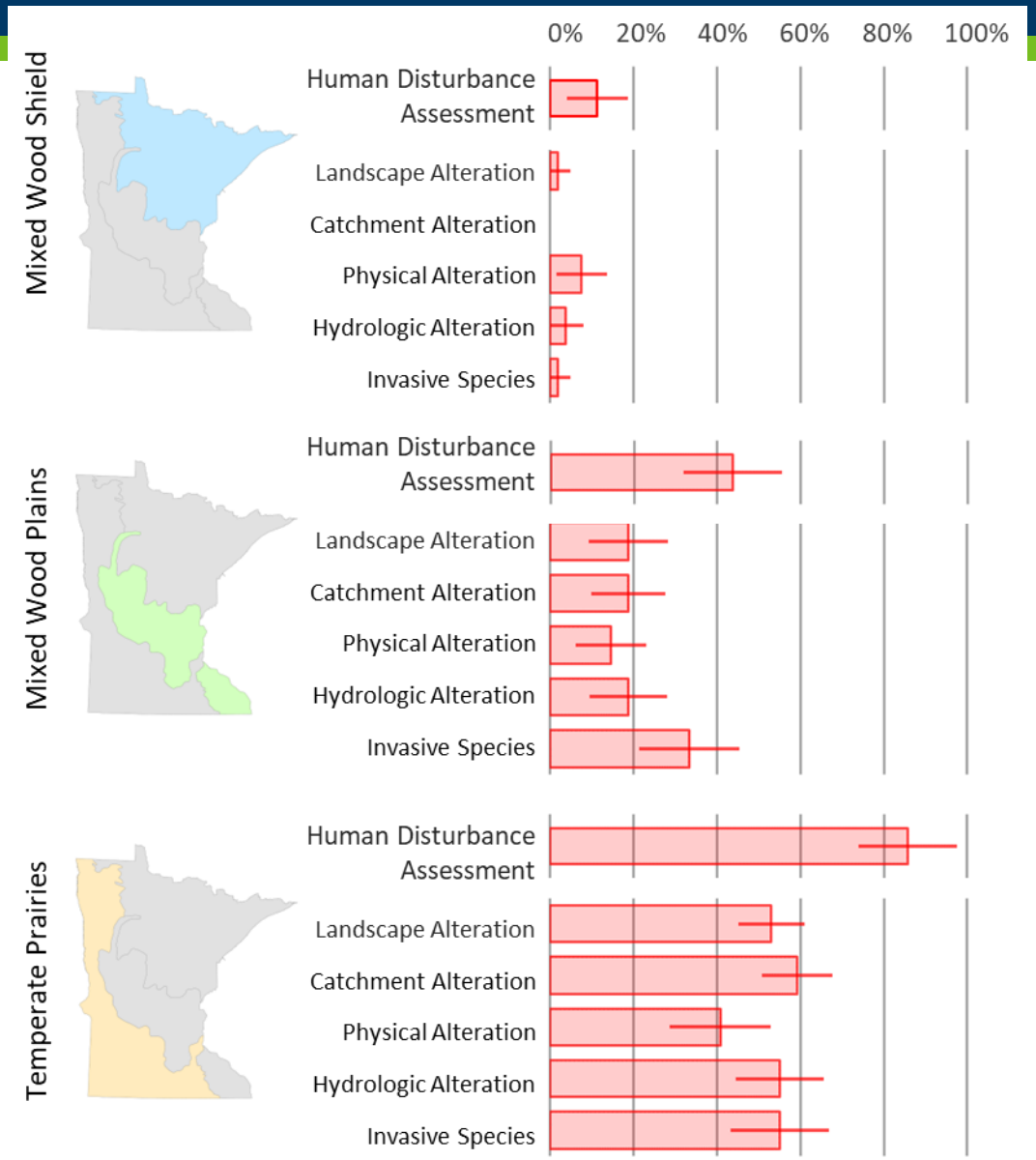
Human Disturbance Assessment (HDA)

- Qualitative approach to systematically observe, document, and rate impacts/stressors
- Relies on historical/current aerial photo interpretation, spatial data sources, field observations, landowner accounts
- Individual HDA factors
  - Landscape alteration
  - Immediate catchment alteration
  - Physical alteration
  - Hydrologic alteration
  - Invasive species
- Replaces previous BPJ/narrative criteria based HDA



Depressional basin HDA-Assessment Area (blue) and immediate catchment (red) (Blue Earth Co.)

2021 regional HDA estimates



Mixed Wood Shield

- Few human impacts @ severe level
- Physical alteration ~8% @ severe and ~13% @ moderate levels

Mixed Wood Plains

- Increased human impacts @ severe level compared to the MWS
- ~44% of wetlands with severe HDA

Temperate Prairies

- Majority of wetlands with severe HDA (~86%)

Specific impacts – silviculture in coniferous swamps

2016

2023 (harvest ~ 2017)

Specific impacts – silviculture in coniferous swamps

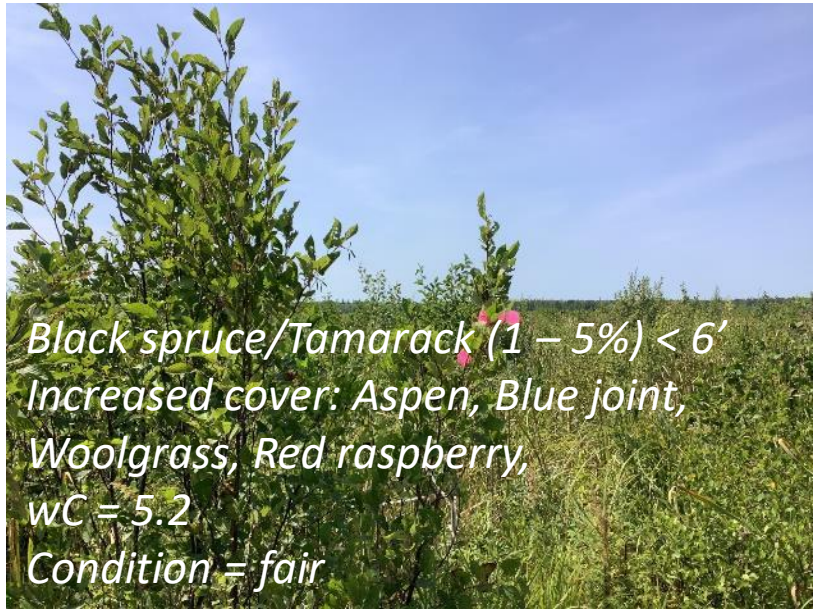
- Silviculture exempt in MN Wetland Conservation Act
- MN DNR *and* USFWS detecting significant conversion of forested to emergent/scrub-shrub wetland
- Substantial extent of wetland
- Condition estimates mixed (wide error margins)
- General model: logging primarily a temporal type of impact

MWS Coniferous swamp logging (@ high cover) estimates

Harvest Status	% Wetland (±)	Acres (±)
Recently cut (trees < 6')	11% (±13%)	275k (± 341k)
Recovered/ recovering	21% (±12%)	550k (± 318k)

2016

2023 (harvest ~ 2017)



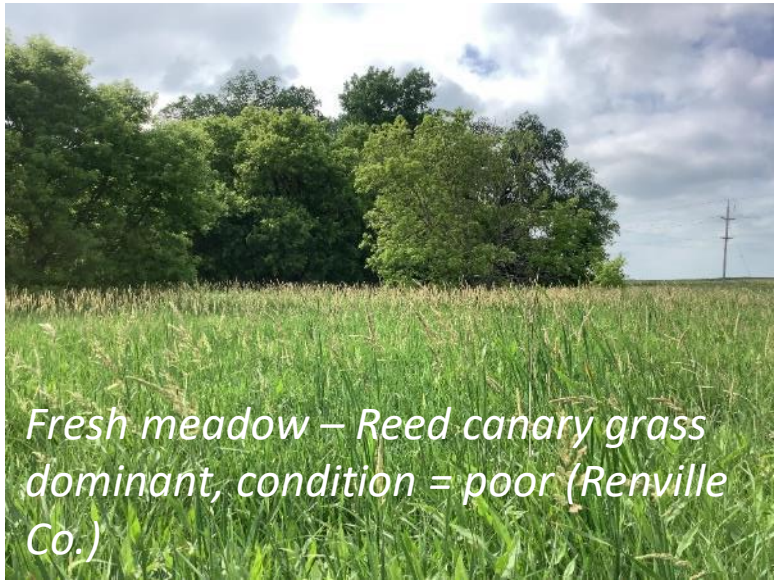
Specific impacts - invasives

Non-native invasive vegetation

- Associated w/other impacts *and* an independent stressor
- Most widespread wetland veg quality stressor in Mixed Wood Plains and Temperate Prairies
- Reed canary grass & Narrow leaved/hybrid cattail biggest problems
- Not self-correcting

Ecoregion	Non-native present	Non-native cover > 50%
MWS	43% (±5%)	2% (± 3%)
MWP	94% (±6%)	33% (±12%)
TP	98% (±4%)	53% (±12%)

Shallow marsh – Narrow leaved/hybrid cattail dominant, condition = poor (Benton Co.)



Fresh meadow – Reed canary grass dominant, condition = poor (Renville Co.)

Shrub-Carr – Glossy buckthorn sub-dominant, condition = fair (Isanti Co.)

Specific Impacts

Many more impact estimates will be provided in reporting

- Vehicle damage
- Excavation
- Grazing
- Herbicide treatment
- Water subtraction/addition/flow obstruction
- Ditching (in/out)
- Water regime change
- Existence level hydro-alteration
- Seasonal/semipermanently flooded water regime stabilization
- Enhanced flashiness
- Emerald Ash Borer
- Eastern Larch Beetle

Intact black ash swamp (Aitkin Co.)
Emerald Ash Borer present @ ~164k ac (1.7%)

Shallow marsh herbicide treated to control invasive cattail, 3 years post treatment (Marshall Co.)
~39k ac (0.4%) of MN's wetlands w/large scale herbicide treatment

Conclusions

- Overall picture largely remains the same
- Majority of Minnesota's wetlands support high quality vegetation driven wetlands in the northern part of the state
- Veg quality largely degraded in the Mixed Wood Plains & Temperate Prairies
- No difference over time at the statewide scale
- Regional significant differences likely due to sampling/random error
- Improved ability to describe wetland veg quality and impacts in greater detail

Wild rice-deep marsh, area was once upland, logged ~1920 and a reservoir was created (Wolf Lake) resulting in high quality wetland habitat (St. Louis Co.)

What's next?

- Reporting spring/summer (coordinated w/Depressional Wetland Quality Assessment)
- 2026 National Wetland Condition Assessment
- Soils at intensification sites

Many thanks!

Matt Lundberg, Taylor Groby, Lauren Laughlin, Ben Adolphson, Anevay Muchko, Ethan Engle, Jennifer Strahan, Brad Maas, John Genet, Mark Gernes & many others



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Floating mat rich fen in a depressional basin (Douglas Co.)