Wetland Assessment and Ecosystem Services

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Wetland Ecosystem Services

- Improved water quality
- Groundwater replenishment
- Habitat for fish, wildlife, and plant species
- Floodwater storage
- Nutrient cycling
- Recreational and educational opportunities

Wetland Assessments

- Provide current wetland condition

- Identify major stressors
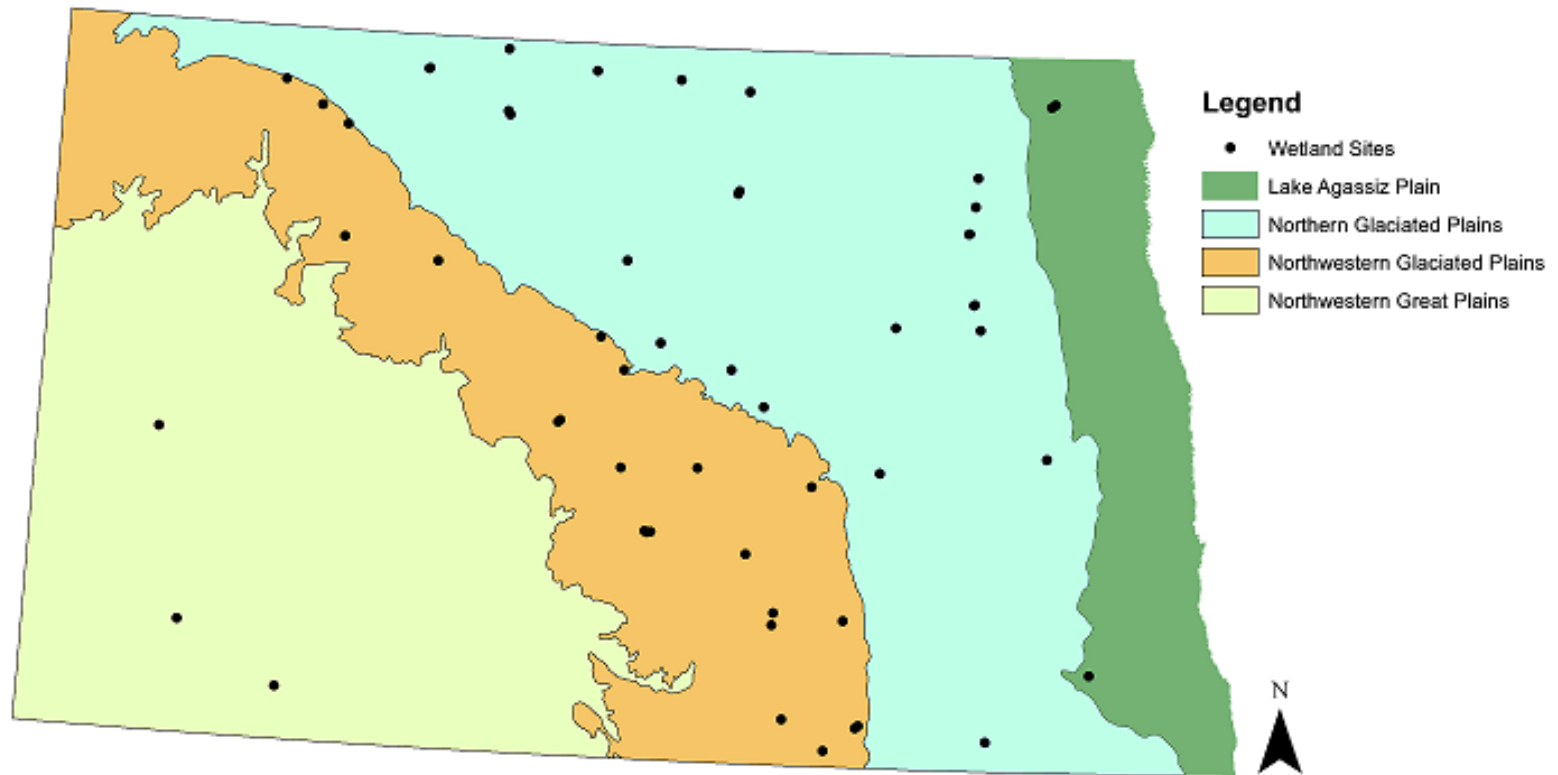
- Are tools for monitoring over time

Methods

- Summer of 2011
- 55 sites across North Dakota
- Assessments:
  - National Wetland Condition Assessment (NWCA)
  - Index of Plant Community Integrity (IPCI)
  - North Dakota Rapid Assessment (NDRAM)
  - Hydrogeomorphic (HGM) Model
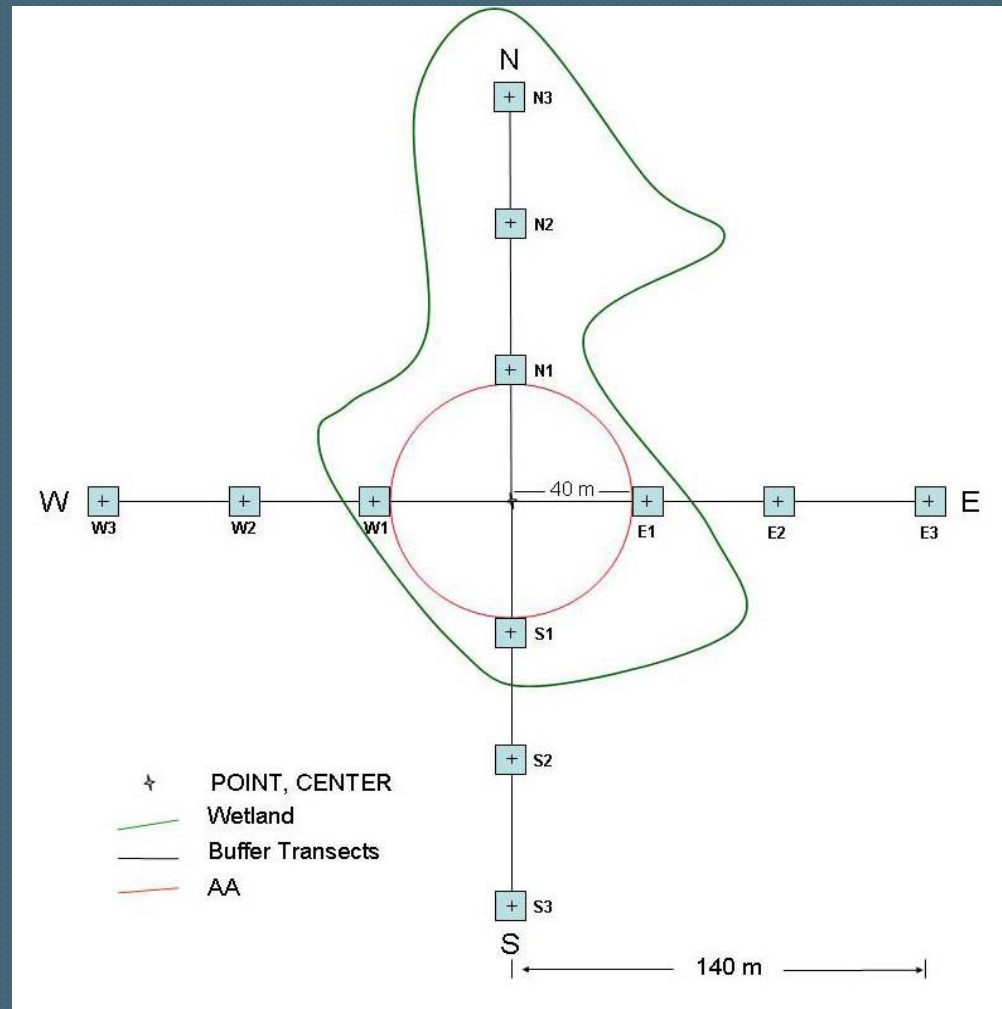- Other samples:
  - Plant
  - Soil

Study Sites

NWCA

- Used nation-wide
- Wetlands are diverse in type
- ND wetlands
  - Many temporary and seasonal
  - Many with little to no tree species
- Characterization of the wetland buffer, vegetation, soils, hydrology, water quality, algae, and a rapid assessment
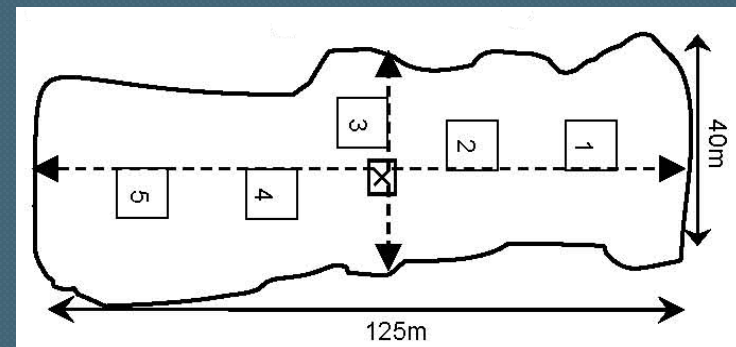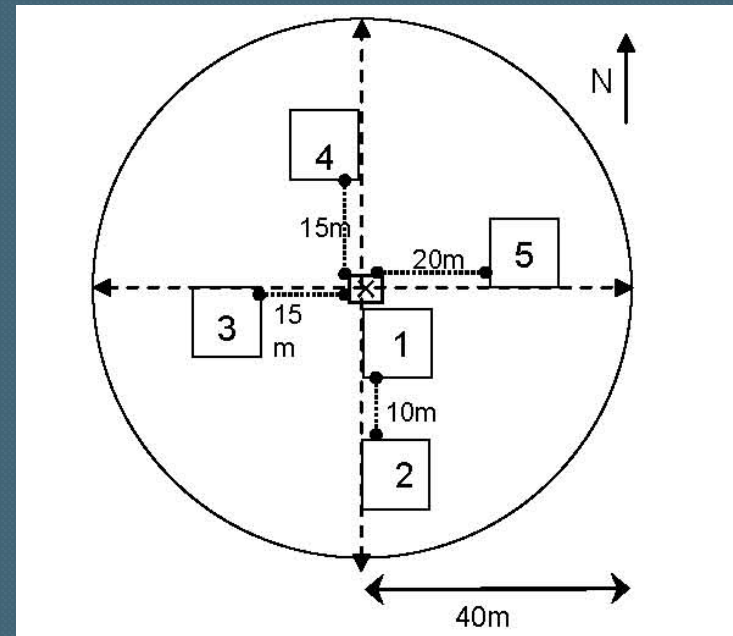
NWCA

 Buffer plots
- 13 buffer plots
- Vegetative cover
- Stressors
- Alien species

- Vegetation plots
  - Five 100-m^2 plots
  - Plant species
    - Cover
    - Height classes
  - Diameter measurements
    - Live tree species
    - Standing dead trees

- Soil pits
  - 4 pits
  - Soil profile
  - Physical characteristics
  - Hydric soil indicators
- Representative pit
  - Most representative of the 4
  - Nitrogen isotope samples
  - Sediment enzyme samples
  - Bulk density samples
  - Soil chemistry samples

- Hydrology
  - Water sources
  - Hydrology indicators
  - Hydrology stressors

- Water quality
  - Wetlands with surface water > 15 cm deep
  - Surface water characteristics
  - Water chemistry samples
  - Surface water field probe readings
    - Dissolved oxygen
    - pH
    - Conductivity
    - Water temperature

- Algae samples
  - Substrate samples for algae taxonomic ID
  - Water > 15 cm deep
    - Chlorophyll-a
    - Epiphyte algae samples (aquatic vegetation) or surface water for algal toxins sample

- U.S. Rapid Assessment Method
  - Buffer characteristics
    - Buffer width
    - Buffer stressors
  - Physical and biological structure
    - Topography
    - Plant community complexity
  - Stressors
    - Alterations to wetland
    - Invasive plant species
    - Vegetative disturbance

Regional Methods

- Index of Plant Community Integrity (IPCI)
- North Dakota Rapid Assessment (NDRAM)
- Hydrogeomorphic (HGM) Model

Plant and Soil Samples

- 3 landscape positions
  - Mid-slope
  - Wet meadow
  - Shallow marsh

Plant Samples

- Clipped five 0.25-m^2 quadrats by type of vegetation at each landscape position
  - Warm season grasses
  - Cool season grasses
  - Sedges and rushes
  - Forbs and shrubs
  - Cattails
- Weighed for biomass
- Phosphorus, Nitrogen, and Carbon nutrient analysis

Soil Samples

- Samples for Phosphorus and Mercury content
  - Collected at the same 3 landscape positions
  - Six 500 g soil cores at each position
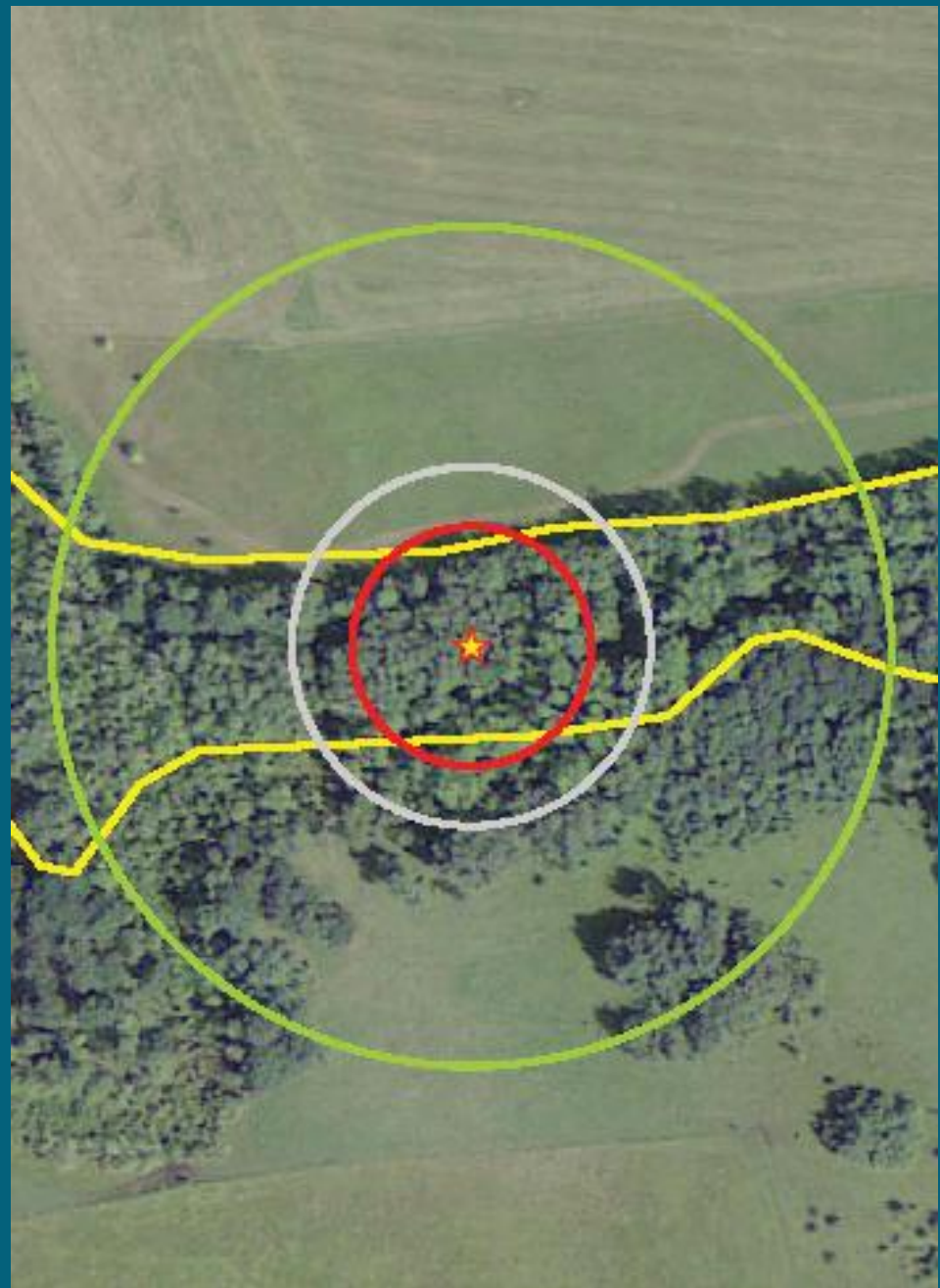   - Three from 0-15 cm
    - Three from 15-30 cm

	Seasonal
Very good	4
Good	6
Fair	6
Poor	4
Very poor	3
Total	23

	Temporary*	Semi-permanent**
Good	2	8
Fair	2	9
Poor	0	11
Total	4	28

*2 are riparian, 1 is a fen
**2 are riparian, many are permanent and edges of shallow lakes

NDRAM

	Temporary*	Seasonal	Semi-permanent**
Good	2	6	8
Fair High	0	5	12
Fair Low	2	6	7
Poor	0	6	1
Total	4	23	28

*2 are riparian, 1 is a fen
**2 are riparian, many are permanent and edges of shallow lakes

Future Analyses

- Comparison of wetland assessment methods
- Modeling of wetland assessment, land use, and/or nutrient pools
- Comparisons of how & where nutrients are stored in different wetlands
- Analysis of ecosystem services
  - Vegetation
  - Nutrient cycling

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Questions?

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