Unique Wetland Delineation Case Studies

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Wetland Identification Program
Chap 5 of the Regional Supplements

Difficult Wetland Situations:
- Fluvial floodplain deposits
- Hydrology in ditched/drained areas
- Wetland/Upland Mosaics
Difficult Situation

Active Fluvial Systems

- Occur in active channels and above bankfull levels of rivers and streams
- Often lack hydric soil indicators due to frequent deposition of new soil material.
- Also often lack sufficient wetland hydrology indicators, or have misleading indicators caused by passed, abnormally high flood conditions.
Difficult Situation

Active Fluvial Systems

First Bottom
- Mix of wetland and upland landforms

Channel

Typically Upland
Difficult Situation

Active Fluvial Systems

• Example – St. Croix River
Difficult Situation

Active Fluvial Systems

- WWI Mapping – Forested Wetland-T3H and T3K
- Soil Mapping – Udifluvents
  - ...sediment that has been deposited too recently for distinct horizons to form...
  - Not hydric soils, but have inclusions of wetter soils in depressions and drainageways
  - Frequently flooded for brief periods, especially in spring. (>50 years out of 100, for between 2 and 7 days).

YUCK!!!
Difficult Situation

Active Fluvial Systems
Difficult Situation

Active Fluvial Systems

Wettest

Typical

September 2005

August 2007
Difficult Situation

Active Fluvial Systems

- Original Wetland Delineation
Difficult Situation

Active Fluvial Systems

- Small site, only two data points

**Wetland Point**
- Dominant Vegetation
  - Quercus macrocarpa
  - Fraxinus pennsylvanica
  - Solidago gigantea
- Soils
  - 0-3 10YR 4/2, sand
  - 3-4 10YR 4/1, sand
  - 4-7 10YR 4/2, sand
  - 7-9 10YR 4/1, sand
  - 9-12 10YR 4/2, sand
  - 12-29 10YR 4/1, sand

- Hydrology Indicators
  - Water Marks
  - Drift Deposits
  - Geomorphic position
  - FAC-Neutral

- Agency Interpretation
  - No hydric soil indicator
  - Has vegetation and hydrology indicators
Difficult Situation
Active Fluvial Systems

• Small site, only two data points

Upland Point
• Dominant Vegetation
  • Fraxinus pennsylvanica
  • Ulmus americana
  • Quercus rubra AND Q. velutina
  • Rhamnus cathartica
  • Toxicodendron radicans
  • Parthenocissus quinquefolia
  • Sicyos angulatus

• Soils
  • 0-9 10YR 4/3, sand
  • 9-18 10YR 5/2, sand

• Hydrology Indicators
  • None noted
  • Agency concern regarding potential for flooding beyond flagged wetland boundary

• Agency Interpretation
  • No hydric soil indicator
  • Hydrophytic vegetation
  • Agency concern regarding hydrology indicators
Difficult Situation

Active Fluvial Systems

- How to resolve agency concerns???
- Suggested analyzing gage data

St. Croix Falls gage has data dating back to 1901

Determine what the median, yearly 14 day high water period is during the growing season
  - Determines the growing season flood elevation for 50/100 yrs.
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Highest Value = 685.61 (1975)

Lowest Value = 675.32 (1988)

Median Value = 680.31 (75 years of data)
Difficult Situation

Active Fluvial Systems

• Revised Wetland Delineation
Difficult Situation

Active Fluvial Systems

Before

After

August 2007
Difficult Situation

Determining Effectiveness of Drains

- Common throughout Wisconsin in agricultural areas and maintained lawns

- Difficult due to significantly disturbed vegetation and hydric soils that may or may not reflect current hydrologic conditions
Difficult Situation

Determining Effectiveness of Drains

Photographs from Purdue University
Difficult Situation

Determining Effectiveness of Drains

• Example – Brown County

WWI – Emergent wetland in southeast corner of project area. Forested wetlands mapped immediately adjacent to site on east and west sides.

Soils – Tedrow loamy fine sand
• Not a hydric soil, but hydric inclusions in drainageways (and depressions)

Tiles in project area repaired in 2015.
Difficult Situation

Determining Effectiveness of Drains

- Original Delineation Summary

No wetlands found
  - Dominant Vegetation
    - Triticum aestivum
  - Soils (typical)
    - 0-12 10YR 3/1, lfs
    - 12-16 7.5YR 5/6, fs
    - 16-24 7.5YR 4/6, 5%
      5YR 5/8 conc., fs
    - 24-30 7.5YR 6/3, 10%
      5YR 5/8 conc., s

- Hydrology Indicators
  - None noted

- Agency Interpretation
  - Although no parameters noted, questions due to adjacent WWI mapping and a few air photo signatures.
  - Significantly disturbed site, that warrants additional investigation
Difficult Situation

Determining Effectiveness of Drains

- How to resolve agency concerns???
- Suggested scope and effect analysis of the drainage system.

van Schilfgaarde Equation

Example tile drainage system
Tile and Soil Boring Map

Tile Data

Tile Install and Repair: Drainage USA (Owner: Joe Pagel)
Tile Depth: ~3.00 - 4.00'
Tile Diameter: 4”
Tile Spacing: 60’
Collection Header Depth: ~4.00 - 5.00’
Difficult Situation

Determining Effectiveness of Drains

- Tile information was used to complete van Schilfgaarde Equation

Soil Data User Entered

- DRAINABLE POROSITY, f = 0.21
- HYDRAULIC CONDUCTIVITY ABOVE DRAIN, Ka = 6.3 in/hr
- HYDRAULIC CONDUCTIVITY BELOW DRAIN, Kb = 6.3 in/hr
- INITIAL WATER LEVEL HEIGHT OVER BARRIER, h1 = 10.0 feet
- FINAL WATER LEVEL HEIGHT OVER BARRIER, h2 = 9.0 feet
- DRAIN HEIGHT OVER BARRIER, h3 = 7.0 feet
- DRAIN DEPTH BELOW GROUNDLINE, h4 = 3.0 feet
- EFFECTIVE RADIUS OF DRAIN, Re = 0.167 feet
- TIME FOR WATER DRAWDOWN, T = 14.0 days

van Schilfgaarde Equation: LATERAL EFFECT 183.7 FT
Difficult Situation

Determining Effectiveness of Drains

- van Schilfgaarde Equation compared to NRCS Lateral Effect Tables

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<th>NRCS Drainage Table Lateral Effect</th>
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Difficult Situation

Determining Effectiveness of Drains

- Original Delineation Summary

**No wetlands found**

Based on Additional Data, DNR Concurred with findings.
Difficult Situation

Determining Effectiveness of Drains #2

• Original Delineation:
  • Project area both within and adjacent to active ag field.
  • Hydric/hydric inclusion soils predominate.
  • WWI mapped wetlands within and around project area.
  • Ag field used mostly for turf grass production.
**Difficult Situation**

Determining Effectiveness of Drains #2

- Wetland Sample Point in Ag Field

**Vegetation:**
Harvested soybeans, no other vegetation present. Significantly disturbed; vegetation not considered in overall determination.

**Hydrology:**
No primary; Saturation Visible on Aerial Imagery (C9) and Geomorphic Position (D2) checked.

**Soils:**
Hydric soil field indicator A11 observed.
Difficult Situation

Determining Effectiveness of Drains #2

Concurrence site visit

• Obvious evidence of a tile system observed in the field.
• Is Geomorphic Position indicator applicable here?
• Recall from regional supplement: “This indicator not applicable in areas with functioning drainage systems”.

Difficult Situation

Determining Effectiveness of Drains #2

Tile Mapping for Entire Field Provided by the Landowner:
Difficult Situation

Determining Effectiveness of Drains #2

The tile map provided evidence that the portions of the project area within the active ag field were effectively drained and that the Geomorphic Position hydrology indicator is not met. No hydrology = no wetland.

Before

After
Difficult Situation

Determining Effectiveness of Drains #2

“It should be noted that a portion of the project area is effectively drained by a tile system. If the tiling system is not maintained much of this portion of the project area may eventually meet wetland criteria”.

Before

After
Difficult Situation

Wetland/Upland Mosaics

- Wetland and upland are “complexed” and shift back and forth irregularly over short distances.
- Conditions typically based on small changes in elevation (microtopography)
- In general, easy to identify but hard to delineate!
Difficult Situation

Wetland/Upland Mosaics
Difficult Situation

Wetland/Upland Mosaics

- WWI Mapping – Nothing nearby
- Soil Mapping – Primarily Kewaunee (KnB) Non-hydric soil with hydric component (3% Poygan)
- Wooded corner of a larger project area
- At least two small surface drainages within the wooded area
- WETS: Drier than normal
Difficult Situation

Wetland/Upland Mosaics

• Original Wetland Delineation Figure:

Note the three small wetland areas between the two larger wetland drainages to the north and south.
Difficult Situation

Wetland/Upland Mosaics

- Wetland points within W-5 and W-6:

  - Dominant Vegetation
    - *Tilia americana*
    - *Carya cordiformis*
    - *Viburnum lentago*
    - *Carpinus caroliniana*
    - *Carex blanda*

  - Soils
    - F3 and F6 Indicators observed

  - Hydrology Indicators
    - Saturation
    - Sparsely Vegetated
    - Concave Surface
    - Water-Stained Leaves
    - Geomorphic Position
    - Microtopograhic Relief
Difficult Situation

- Photos of Wetland Depressions Within Woods:
Difficult Situation

Upland/Wetland Mosaics

– Agency Interpretation: Numerous other areas similar to W-5, W-6, and W-7 observed within the woods during the concurrence site visit

– Concern that not all regulated wetland was delineated during the initial field investigation, but recognition that delineation using routine methods in this area not efficient/feasible.
Difficult Situation

Upland/Wetland Mosaics

The solution: Consider the area a mosaic, and use point-intercept sampling to determine upland/wetland percentages.
Difficult Situation

Upland/Wetland Mosaics

Two transects were placed with the wetland/non-wetland mosaic area. Sampling was conducted at 76 points along the transects (see attached figure and photographic log). At each transect, indicators of hydrophytic vegetation, hydric soil, and wetland hydrology were used to determine if the point was wetland or upland. Of the 76 sample points, 30 were determined to be wetland. Using the formula above, this translates into 30/76 x 100 or 39.47% of the area occupied by wetland. The area between W-2 and W-3 was approximately 3.18 acres, so the estimated area of wetland within the woods is approximately 1.255 Acres. Wetlands in this area are made up of sparsely vegetated depressions consisting of hardwood swamp and shrub swamp.
Difficult Situation

Wetland/Upland Mosaics

NOTE: WETLAND MOSAIC AREA OUTLINED IN GREEN AND REPLACES Delineated WETLANDS W-5 THROUGH W-7. FOR PERMITTING PURPOSES 40%, OR 1.255 ACRES, OF THIS AREA IS REGULATED WETLAND.