Introduction to Wetland Delineation & Regulation

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Professional Certification Program

1

Class Purpose

The purpose of the MWPCP Introduction to Wetland Delineation and Regulation Course is to teach the fundamental subjects of wetland delineation and regulation in Minnesota. The course takes a field-based, multi-disciplinary approach to wetland science and resource management for private and public sector professionals.

Subjects covered include a comprehensive study of the 3-parameter (hydrology, vegetation, soil) approach to wetland delineation, along with their indicators and tests; wetland classification systems; wetland functions; restoration and monitoring; and wetland regulatory programs in MN with an emphasis on the basic administration of the Wetland Conservation Act including Local Government Unit duties, Technical Evaluation Panel procedures, decision types, application procedures, wetland banking, and enforcement procedures.

2

MWPCP CORE CURRICULUM

1) **Wetland Conservation Act (WCA)**- MN Rule Chapter 8420 and underlying Statutes, Agency Guidance
2) **Purpose**- No net loss; increase quantity, quality & biological diversity; avoid, minimize, replace
3) **Scope**- What WCA Regulates & does NOT regulate
4) **Other Regulatory Programs**- Section 404 of the Clean Water Act, MN Public Waters Program, NRCS Swampbuster
5) **Local Government Unit (LGU)**- Determining the LGU & LGU Duties
6) **Technical Evaluation Panel (TEP)**- TEP members, procedures, meetings, recommendations, and findings of fact.
7) **Critical Definitions**- Important WCA and delineation manual definitions
8) **Wetland Classification Systems**- Circular 39, Cowardin, Eggers & Reed, Hydrogeomorphic method
9) **Wetland Ecology & Functional Assessment**- Understanding wetland functions and values, assessment methods
10) **Wetland Delineation**- USACE 1987 Manual and Regional Supplements & guidance documents
    a) **Vegetation**- Plant ID, plant communities, definition of a hydrophyte, National Wetland Plant List, plant indicator status, determining hydrophytic vegetation, problematic vegetation
    b) **Soil**- Definition of hydric soil, key physical properties, textural divisions, Web Soil Survey, Field Indicators of Hydric Soils
    c) **Hydrology** - Hydrology technical standard, hydrology indicators, antecedent precipitation, offsite aerial imagery review
11) **Application Procedures**- General WCA application requirements, determining a complete application, file management
12) **Noticing Requirements**- Notice of Application, Notice of Decision, timelines
13) **Boundary and Type Applications**- Required report components, site review
14) **No-Loss Criteria**- Activities with no permanent loss or impact to wetlands
15) **Exemption Standards**- Impacts to wetlands that do not require replacement
16) **Replacement plans**- Purpose & requirement, application requirements, approval conditions, special considerations, sequencing, replacement standards
17) **Wetland Banking –** Purpose, bank types, actions eligible for credit, establishing a wetland bank, restoration construction methods, certification and deposit of credits, replacement for public road projects, monitoring and corrective actions, withdrawals and transfers
18) **Enforcement & Appeals**- Enforcement procedures, Agency Roles in violations, restoration methods, voluntary restorations, appeal process

3

Basic Agenda

Monday

- 3 Parameters, Delineation Methods, Wetland Function & Classification Systems, Hydrology Indicators, Critical Definitions, Data Sheet Field Exercise

Tuesday

- Quiz 1, Antecedent Precipitation, Offsite Resources and Hydrology Methods, Soil Concepts, Hydric Soil Indicators, Web Soil Survey, Soil Texture Lab, Soil profile description field exercise

Wednesday

- Quiz 2, Intro to Regulatory Programs, WCA Basic Decision Types, LGU Duties, Technical Evaluation Panel, WCA Application Procedures, Wetland Vegetation, Vegetation Field Plots Exercise

Thursday

- Quiz 3, Small Group delineation Field Exercise, Submitting Delineations, Replacement Plans, Wetland Banks, Monitoring and

Friday

- WCA Enforcement, Altered Hydrology and Wetland Restoration, Functional Assessments Methods, Course Summary & Summary Quiz

- MWPCP Professional Exams

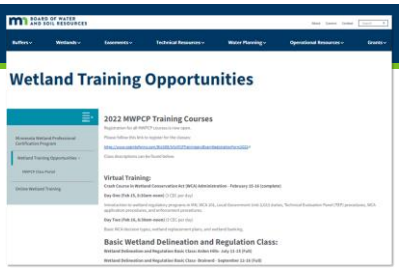
4

Science first, then apply policy

Minnesota Wetland Professional Certification Program

5

Resources



- https://bwsr.state.mn.us/wetland-training-opportunities

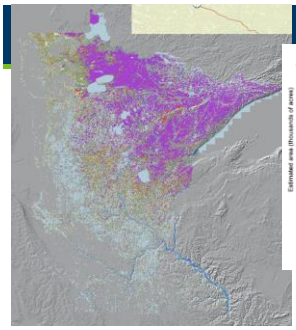
6

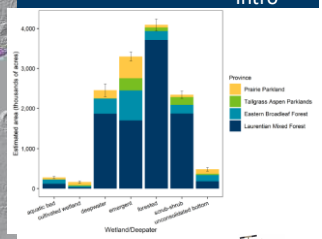
Resources

[MWPCP Class Portal]

7

Intro





Minnesota Wetland Professional Certification Program

8

Pop Quiz

According to the 2019 Minnesota update of the National Wetland Inventory, how many acres of wetlands are in MN?

A) 6.3 million acres

B) 10.5 million acres

C) 12.2 million acres

D) 24.4 million acres

9



Three Parameters of a Wetland

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Professional Certification Program

10

What is a Wetland?

Definition: Those areas inundated or saturated by surface or ground **water** at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of **vegetation** typically adapted to life in saturated **soil** conditions.


Hydrology + Vegetation + Soil = Wetland

11

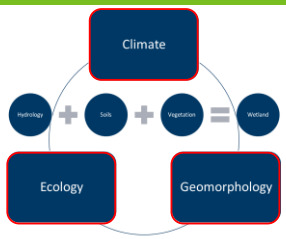
3 Parameters of a Wetland

- 3 Parameters of a wetland
  - Hydrology- frequency and duration of movement of water through a landscape
  - Soil- organic and mineral surfaces which often exhibit characteristics that it has been in saturated conditions
  - Vegetation- plant community and prevalence of species that have made adaptations to live in saturated conditions

12

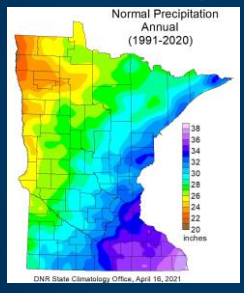
Factors

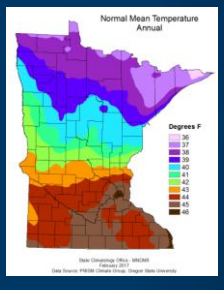
- Overarching factors that determine much of the condition of an area
- Examples:
  - Climate determines antecedent precipitation
  - Ecology determines dominate plant communities
  - Geomorphology determines landscapes and soil parent material



13

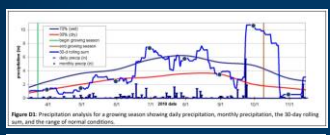
Climate- long term weather pattern of an area

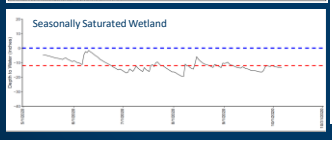




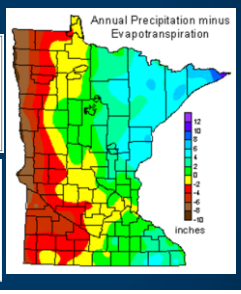
14

Climate affects wetland water budgets





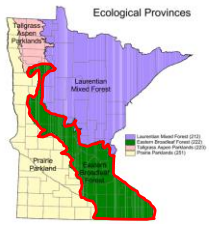
Climate to hydrology



15

Eastern Broadleaf Forest Province

- Large province- Almost 12 million acres across MN, IA, WI, OH, NY, IL, IN, KT, MS, AR
- Transition between semi-arid prairie and semi-humid mixed forest of SE/NE
  - Prairie species meet eastern ranges
  - Forest species meet western ranges
- Landforms largely glacial deposits and recent erosion
- Precipitation approximately equals evapotranspiration
- Avg Precipitation 24-35 inches
- Avg temperatures 38-46 F



16

Prairie Parkland Province

- In MN covers over 16 million acres
- Historically tallgrass prairie
- Evapotranspiration greater than precipitation
- Heavily glaciated including multiple advances during Wisconsin glaciation
- Des Moines lobe fronted by largest pro-glacial lake in North American- Glacial Lake Agassiz
- Glacial river Warren outlet south end of Agassiz and eroded much of current MN River valley

17

Laurentian Mixed Forest Province

- Covers MN, WI, MI, southern Ontario and parts of New England
- In MN covers 23 million acres
- Mixed conifer and hardwood forests
- Varys from thin glacial deposits over bedrock, deep glacial till, thick peatlands
- Precipitation increases SW-NE
- Temperature decreases SW-NE
- Vegetation changes accordingly

18

Geomorphology

Study of physical features on the surface of the earth and their relation to its geologic structures.

19

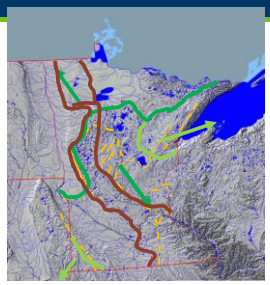
Watersheds and Ecologic Sections

Glacial landforms define MN topography

Major Watersheds align with:

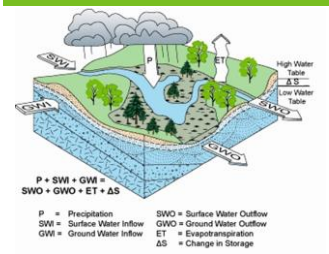
Ecologic provinces

Along with climate



20

Hydrology



- Inputs
  - Precipitation
  - Surface water inflow
  - Groundwater inflow
- Outputs
  - Surface water outflow
  - Groundwater outflow
  - Evapotranspiration

21

Wetland Hydrology

1987 Corps Manual: "*The sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.*"

Regional Supplements: "*Wetland hydrology indicators are used in combination with hydric soil and hydrophytic vegetation to determine whether an area is wetland under the Corps manual.*"

22

Hydrology Technical Standard

…"inundated or saturated by surface or ground water at a frequency and duration"

Technical standard if hydrology indicators not observed:

- 14 or more consecutive days of flooding or ponding;
- Water table 12 in. or less below soil surface;

23

Hydrology Indicators

Evidence that there is continuing hydrology and confirms that an episode of inundation/saturation occurred recently.

Wetland hydrology indicators are divided into two categories:

Primary – provide stand-alone evidence of a current or recent hydrologic event; and

Secondary – provide evidence of recent hydrology when supported by one or more other hydrology indicators.

24

Soil

"…sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions"



25

Hydric Soil

- A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding **long enough** during the **growing season** to develop anaerobic conditions in the **upper part**.

26

Hydric Soil Indicators

Based on key physical properties: color & texture

And the depth & thickness where they are found


27

Vegetation

"…sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions"

Wetland Indicator Status	Definition
Obligate Wetland (OBL)	Almost always occur in wetlands
Faculative Wetland (FACW)	Usually occur in wetlands, but may occur in non-wetlands
Faculative (FAC)	Occur in wetlands and non-wetlands
Faculative Upland (FACU)	Usually occur in non-wetlands, but may in occur in wetlands
Obligate Upland (UPL)	Almost never occur in wetlands

https://nwpl.sec.usace.army.mil/

28

Hydrophytes

Adaptations to saturated environment:

- morphological (multiple trunks, floating leaves)
- physiological (metabolic pathways)
- reproductive (floating seedlings)

29

Dominance Tests

Methods to determine dominance of hydrophytic vegetation:

- Rapid test
- Dominance test (50/20)
- Prevalence Index
- Morphologic adaptations

30

Rapid Test Example

Hydrophytic Vegetation?

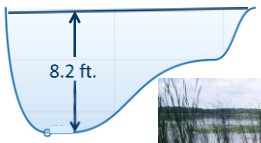
31

Limits of wetland (depth)- Deepwater Habitat

Important Considerations for Wetlands

- Must be capable of supporting rooted, emergent vegetation.
- Must have soil.

If the water is too deep or fast flowing, cannot support rooted vegetation and soil cannot form (unconsolidated bottom).



32

Quiz

- What are the three parameters that define a wetland?

Hydrology + Vegetation + Soil = Wetland

33

Basic Overview of Wetland Delineation

34

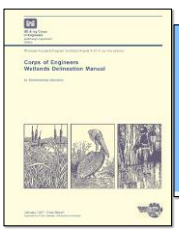
3-Parameter/ Indicator Approach

1. **Soils** –Longest term evidence, Historic conditions, may not reflect current condition.
2. **Hydrology** –Current condition, shortest term evidence but heavily influenced by recent climate conditions
3. **Vegetation** – Somewhere between

The 87 Manual requires 3 parameters because no one source typically gives the answer in all situations

35

87 Manual and Regional Supplements



36

Wetland Delineation Types

Routine – Qualitative Data
- Indicator based (veg, soil, hydro)
- Representative sample points
- Estimate and interpret data
- 3-Types of delineations

Comprehensive – Quantitative Data
- Systematic sampling
- Precise measurements

37

Wetland Delineation Types

ROUTINE

Level 1 - Onsite Inspection Unnecessary

Level 2 - Onsite Inspection Necessary

Level 3 - Combination of Levels 1 and 2

38

Wetland Delineation Types

Routine Level 1

Use when exact wetland boundary **not necessary**

Proposed Shed

39

Routine Level 1

40

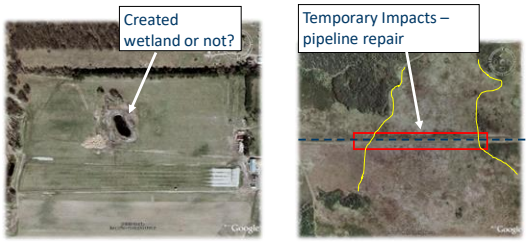
Routine Level 1

41

Routine Level 1

42

Routine Level 1 Examples



43

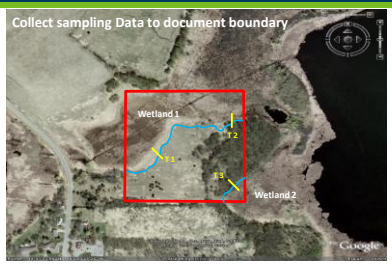
Wetland Delineation Types

Routine Level 2

- Use when an accurate boundary is critical
- Need a formal boundary approval
- Most used and focus of class

44

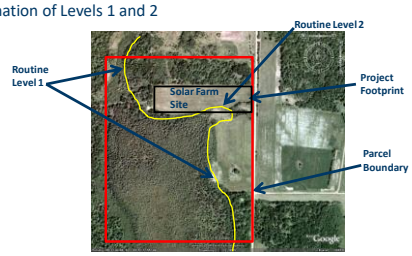
Routine 2



45

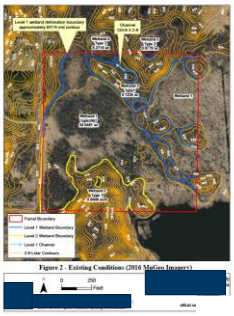
Routine Level 3

Combination of Levels 1 and 2



46

Routine Level 3



47

Wetland Delineation Types

Comprehensive Delineation Method

- Complex, requiring rigorous documentation and coordination
- Quantitative Measurements of:
  - Hydrology
  - Vegetation
  - Soils
- Combine with other methods

48

Comprehensive Delineation

49

Guidance

Delineation Method	Review of offsite mapping resources	Site Visit	Sampling Approach	Complete Field Data Forms	Field Staking of Wetland Boundaries
Routine Level 1	Yes	Sometimes	Offsite	No	No
Routine Level 2	Yes	Yes	Onsite, qualitative	Yes	Yes
Comprehensive	Yes	Yes	Onsite, quantitative	Yes	Yes

WCA Application Type Examples	*Commonly Used* Delineation Method
Temporary impact under No-Loss	Routine Level 1
Banking application: pre-application scoping	Routine Level 1
Banking application: full application	Routine Level 2
Road Program Wetland Impact Documentation—Road project through a large continuous wetland	Routine Level 1
Road Program Wetland Impact Documentation—Scattered wetlands within construction corridor	Routine Level 2
Replacement plan	Routine Level 2
Enforcement actions	Routine Level 2 or Comprehensive
Wetland boundary approval (no project application)	Routine Level 2
Agricultural exemption determination (8420.0420, Subpart 2A)	Routine Level 1

50

50

Routine Level 2 Process

1. Research data sources
   - Know site before visit
   - Saves time and effort
2. Field visit and data collection
   - Data collection
   - Preponderance of evidence
3. Delineate wetland boundary
   - Document indicators of wetland/non-wetland decision
   - Only after multiple informal observations

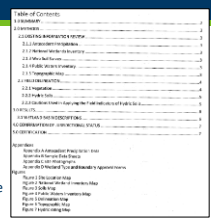


Table of Contents

51

Offsite Resources = Data Sources

- Aerial Photos (current and historic)
- Soil map (Web Soil Survey)
- Topographic\LiDAR
- NWI Map (updated)
- DNR Public Waters Map

52

Routine Level 2 Process

- **Field Visit and Data Collection**
- Use preliminary map to make a plan
- Recon site and make informal observations and samples
- Make notes about general characteristics
  - Plant Communities
  - Topographic changes-Landscape position
  - Changes in soils
  - Precipitation conditions (wet, normal or dry)
  - Data collection/data sheets
- Delineate Wetland Boundary

53

Field Equipment

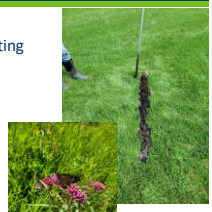
54

Sample Points

1. Top section of data sheet
   - Documents sample location and landscape setting
   - Site conditions Wet-Dry

2. Vegetation
   - ID species to determine if plant community is hydrophytic
   - Record comments on changes in vegetation

3. Soil
   - Describe soil and determine if it is hydric
   - Record comments on changes in soil

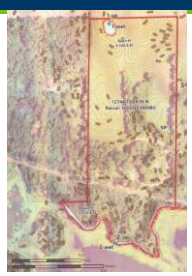


55

Sample Points

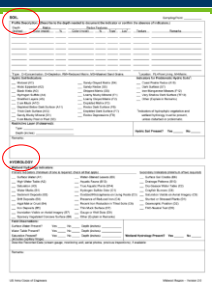
4. Topography
   - Record changes in topography
     - Abrupt
     - Gradual
     - Geomorphic position

5. Other notable remarks and observations
   - Basis for delineation line (sharp topo/veg break)
   - Hydrology inputs and outputs



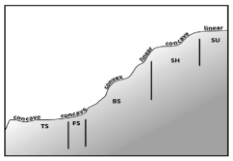
56

It's all about the documentation!



57

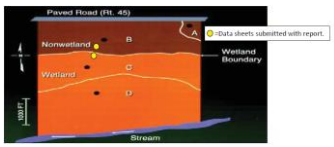
It's all about the documentation!



58

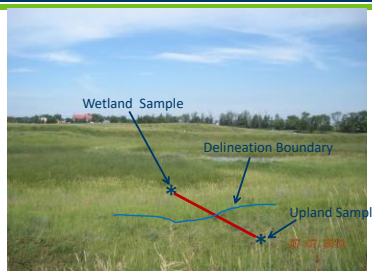
Sampling Location Should Be Representative

- Representative of soil changes (from upland to wetland)
- Representative of vegetation changes
- Representative of hydrology indicator changes
- Representative of landscape changes



59

Routine Level 2 Sampling Transcects



60

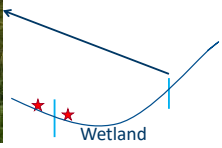
Sample location is important!

Good data collection cannot compensate for poor sampling location choices.

61

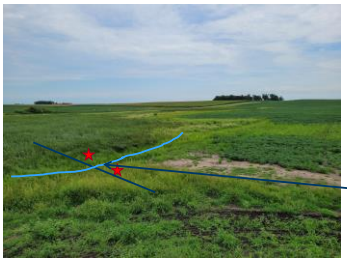
Sampling Location

Steep vs flat topo



62

Sampling Location



Agricultural Field

63

Sampling Location

Road Rights-of-way

- Wetland boundary follows road slope toe.
- Try to select sample points parallel to roadway.

64

Sampling Location

Representative of majority of upland plan community.

65

Sampling Location

Multiple plant communities or difficult sites.

- How many wetlands?
- How many wetland/upland plant communities?
- Land use: pastureland, forest, disturbance?

66

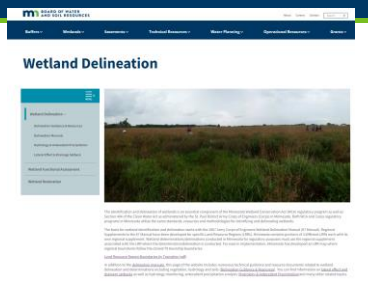
Make a Plan:

- Examining your offsite mapping before heading to the field.
- Do an initial site reconnaissance before settling on a sampling location.
- In tough areas, do "preliminary" sampling to help determine where you should do your "official" representative sampling (i.e. full data sheets).

67

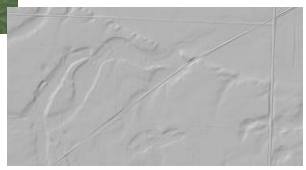
Guidance

BWSR Wetland Delineation page



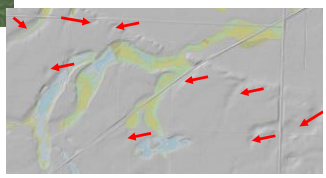
68

Level One Delineation Exercise



69

Level One Delineation Exercise



70

Wetland Classification Systems

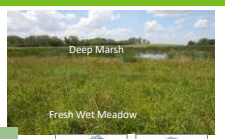
BOARD OF WATER AND SOIL RESOURCES

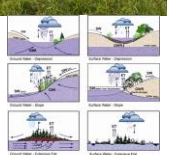
Minnesota Wetland Professional Certification Program

71

Wetland Classification Systems in MN

- Circular 39
- Cowardin et al.
- Eggers & Reed
- Hydrogeomorphic Method





72

Wetland Classification Systems

73

HGM Class	Circular 39	Eggers & Reed	Cowardin Vegetation Class	Typical Water Regimes
Depression	1	Seasonally Flooded Basins	PEM- Emergent	Seasonally Flooded
Riverine	1	Floodplain Forests	PFO- Forested	Temporary Flooded
Depression Sloped Organic Flat	2	Sedge Meadows	PEM- Emergent	Saturated
Riverine Depression Mineral Flat	2	Fresh (wet) Meadows	PEM- Emergent	Saturated
Depression	2	Wet to Wet-Mesic Prairies	PEM- Emergent	Saturated
Sloped	2	Calcareous Fens	PEM- Emergent	Saturated
Depression Lacustrine Fringe	3	Shallow Marsh	PEM- Emergent	Semi permanently flooded (up to 6")
Depression Lacustrine Fringe	4	Deep Marsh	PEM- Emergent PAB-aquatic bed	Semi permanently to permanently flooded (6"-3')
Depression Lacustrine Fringe	5	Shallow, Open Water	PEM- Emergent PUB-Unconsolidated Bottom	Permanently flooded (up to 8.2')
Mineral Flat Sloped	6	Shrub-Carr	PSS- Scrub-shrub	All regimes except permanently flooded (Saturated most of growing season)
Mineral Flat Sloped	6	Alder Thicket	PSS- Scrub-shrub	All regimes except permanently flooded (Saturated most of growing season)
Mineral Flat Sloped	7	Hardwood Swamp	PFO- Forested	All regimes except permanently flooded (Saturated most of growing season)
Mineral Flat Organic Flat Sloped	7	Coniferous Swamp	PFO- Forested	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	8	Open Bog	PML- Moss-lichen	Saturated
Organic Flat	8	Coniferous Bog	PFO- Forested	Saturated

74

Why Classify Wetlands?

- To establish a consistent organizational structure for:
  - Understanding functions
  - Inventory/mapping
  - Scientific study and tracking
  - Regulation

Most systems use

- Vegetation (emergent or forested?)
- Hydrology (standing water or saturation?)
- Water depth (6 inches or 3 feet?)

Some use

- hydrologic source (surface or groundwater fed)
- geomorphic position (position on the landscape).

75

Wetland Functions & Values

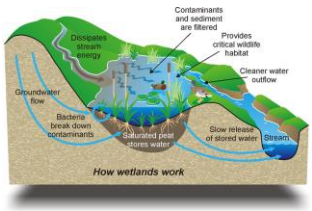
Wetland Functions: in scientific assessments means natural processes

Wetland Value: wetland goods and services providing monetary or social welfare benefit.

76

Wetland Functions

- Act as a natural "filter" to maintain water quality
- Facilitates infiltration recharging groundwater
- Stabilize base flow
- Decreases fluid velocity during high flow events which decreases turbidity
- Storm water retention (i.e. storage)
- Provides habitat
- Shoreline protection



77

Values

More than a billion people make a living from wetlands across the world.

- Fishing
- Eco-tourism
- Farming
- Drinking water

Source: www.worldwildlife.org
Photos: www.ramsar.org

78

Values

Hunting, Fishing, Bird watching, photography

www.nps.org

Mud Duck Boats

79

Values

Recreation, Aesthetics, Education

80

Values

Food Production

Wild Rice

Cranberries

81

Hydrogeomorphic Method

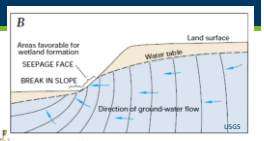
Established classes based on geomorphic, hydrology and hydraulic functions of palustrine wetlands.

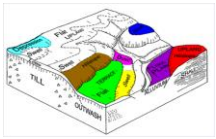
Classification Name	Definition
Lacustrine	Wetland occurs within a topographic depression that has a closed elevation contour that allows the accumulation of surface water and is restricted to the margin of a depressional lake basin.
Riverine	Wetland occurs on a nearly level landform and lies along and is influenced by flooding from a stream, river or flow-through ditch.
Slope	Wetland occurs on a slope (generally >2%) with groundwater discharge as its primary source of hydrology.
Mineral Flat	Wetland occurs on a nearly level landform, is not significantly influenced by flooding from a stream, river or flow-through ditch and has predominately mineral soils.
Organic Flat	Wetland occurs on a nearly level landform, is not significantly influenced by flooding from a stream, river or flow-through ditch and has predominately organic soils.
Depression	Wetland occurs within a topographic depression that has a closed elevation contour that allows the accumulation of surface water and is not associated with the margin of a depressional lake basin.

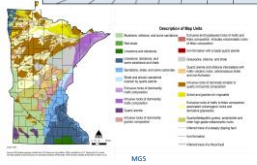
82

Parameters of HGM

- Geomorphology- landscape position
- Hydrology- water source and output
- Hydraulics- hydrodynamics



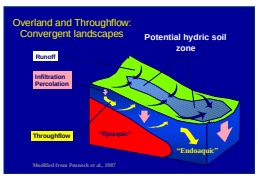


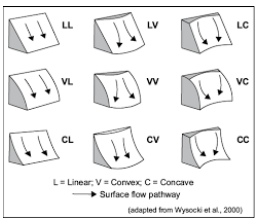


83

Landscape Position- surface shape

- Convex- surface curves outward
- Concave- surface curves inward
- Linear- flat, one-dimensional surface



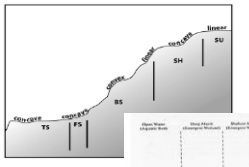


84

Landscape Position- slope processes

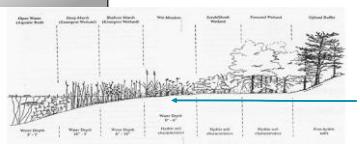
Landscape position:

- Summit
- Shoulder
- Backslope
- Foot slope
- Toe slope



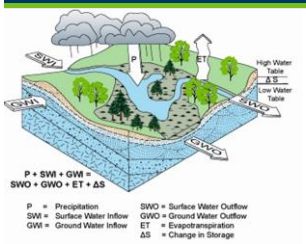
Slope processes:

- Erosional- summit, shoulder, backslope
- Depositional- foot slope, toe slope



85

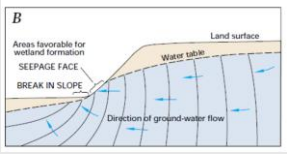
Hydrology



- Inputs
  - Precipitation
  - Surface water inflow
  - Groundwater inflow
- Outputs
  - Surface water outflow
  - Groundwater outflow
  - Evapotranspiration

86

Hydraulics- how water moves



- Uni-directional
- Bi-directional
  - Estuarine and lacustrine fringe

87

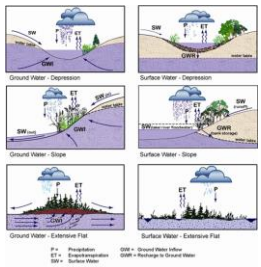
HGM Classes

- RIVERINE
- DEPRESSIONAL
- SLOPE
- MINERAL SOIL FLATS
- ORGANIC SOIL FLATS
- LACUSTRINE FRINGE
- ESTUARINE FRINGE*

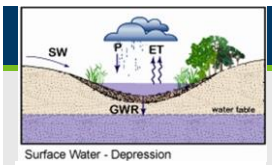
88

HGM Subclasses

- Influenced by:
  - Groundwater input
  - Surface water input
  - Hydrology Outputs
    - Surface
    - Ground



89



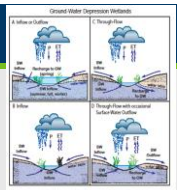
Surface Water - Depression

Depressional- surface

- Landscape position- concave, foot slope/toe slope, closed contours
- Hydraulics- unidirectional
- Water source- surface flow and precipitation, seasonal
- Outputs- Evapotranspiration, groundwater recharge

90

Depressional- groundwater



- Landscape position- concave, foot and toe slopes, closed contours
- Hydraulics- unidirectional
- Water source- groundwater and precipitation, *seasonal*
- Outputs- Evapotranspiration, groundwater recharge, intermittent overland flow

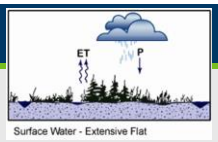
91

Functions

Groundwater Recharge

92

Mineral Soil Flats



Surface Water - Extensive Flat

- Landscape position- relic lake bottoms and floodplains, intergrades to multiple other classes (sloped, riverine, lacustrine)
- Hydraulics- vertical groundwater fluctuations
- Water source- precipitation, no groundwater interaction
- Outputs- evapotranspiration, saturated "seepage" flow

93

Functions

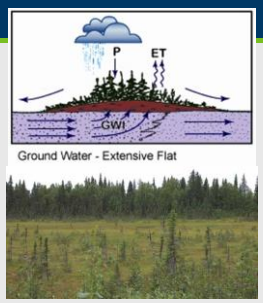
Habitat

- Many insects, reptiles and amphibians rely on wetlands to complete their life cycle.
- Some mammals are semi-aquatic: beavers, muskrat, mink, otters.
- Many birds feed and nest in wetlands.
- Fish rely on wetlands for breeding, feeding and shelter.




94

Organic Soil Flats



- Landscape position- summit (interfluves- broad "plateau" between drainage systems, depressions filled with organics, vertical accretion of organics
- Hydraulics- precipitation, unidirectional groundwater
- Water source- precipitation, groundwater
- Outputs- saturated overland seepage, evapotranspiration

95

Functions

Carbon Storage

Although wetlands only account for 5-8% of earths terrestrial landscape they may provide carbon sinks of about 300 to 700 billion tons of carbon. Peatland wetlands make up the majority of carbon sinks.

96

Riverine

- Landscape position- floodplains and riparian corridors, often intergrade to sloped or depressional
- Hydraulics- unidirectional, surface overbank flow, groundwater, interflow (both surface and ground) from adjacent uplands
- Water source- precipitation, groundwater
- Outputs- overland surface flow (perennial flow not required), evapotranspiration

97

Functions

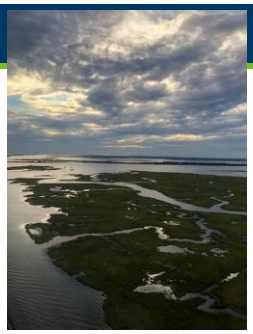
98

Lacustrine Fringe

- Landscape position- adjacent to lakes, toe slope, often intergrade to sloped
- Hydraulics- bidirectional (inflow from adjacent uplands and lake)
- Water source- precipitation, groundwater
- Outputs- return flow to lake, saturated surface seepage, evapotranspiration

99

Estuarine Fringe



- Landscape position- along coasts and estuaries, often intergrade into riverine
- Hydraulics- bidirectional (tidal flow)
- Water source- surface via frequent tidal flooding, precipitation
- Outputs- tidal exchange, saturated overland flow, evapotranspiration

100

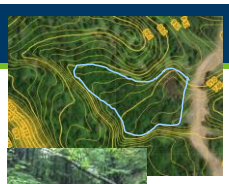
Functions

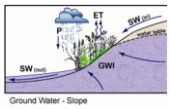
Water Quality

101

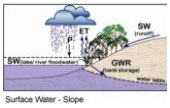
Sloped

- Landscape position- linear or convex, predominately found at foot and toe slope, can be found on back slope and shoulder slope, often intergrades to other classes (mineral flat, riverine, depression)
- Hydraulics- unidirectional
- Water source- groundwater, surface runoff, precipitation
Outputs-





Ground Water - Slope



Surface Water - Slope

102

Functions

Sediment Trap

103

HGM Class (subclass)	Hydrology Inputs	Hydrology Outputs	Hydraulics
RIVERINE	surface flow precipitation groundwater	surface flow evapotranspiration	unidirectional (both surface and ground)
DEPRESSIONAL- surface	surface flow precipitation	groundwater recharge evapotranspiration	unidirectional
DEPRESSIONAL- ground	groundwater precipitation	intermittent surface flow evapotranspiraton groundwater recharge	unidirectional
SLOPED- surface	surface flow precipitation	surface flow evapotranspiration groundwater recharge	unidirectional
SLOPED- ground	groundwater surface water precipitation	surface flow evapotranspiration	unidirectional
MINERAL SOIL FLATS	precipitation intermittent surface flow	evapotranspiration intermittent surface flow	unidirectional
ORGANIC SOIL FLATS	groundwater precipitation	intermittent surface flow Evapotranspiration	unidirectional
ESTUARINE FRINGE	surface flow tidal exchange precipitation	tidal exchange surface flow Evapotranspiration	bidirectional
LACUSTRINE FRINGE	surface flow groundwater precipitation	return flow to lake surface flow evapotranspiration	bidirectional

104

HGM

Dichotomous HGM Classification System Key

1. Wetland does not occur on a nearly level landform 2
1. Wetland occurs on a nearly level landform 3
3. Wetland lies along and its hydrology is significantly influenced by flooding from a stream/river channel or a flow-through ditch ..... **Riverine**
3. Wetland does not lie along and/or is not significantly influenced by a stream/river channel or a flow-through ditch 4
4. Wetland has predominately organic soils ..... **Organic Flat**
4. Wetland has predominately mineral soils ..... **Mineral Flat**
2. Wetland occurs on a slope (generally >2%) with groundwater discharge as its primary source of hydrology ..... **Slope**
2. Wetland occurs within a topographic depression that has a closed elevation contour that allows the accumulation of surface water 5
5. Wetland is not restricted to the margin of a depressional lake basin ..... **Depression**
5. Wetland is restricted to the margin of a depressional lake basin ..... **Lacustrine**

HGM Classification System for Minnesota

105

HGM?

106

Mapping HGM- Depression

107

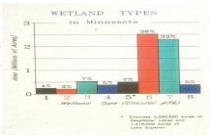
Mapping HGM- Lacustrine Fringe

108

109

Circular 39

- Developed in 1956 for wildlife habitat (waterfowl).
- Previously used in Minnesota Wetland Conservation Act
- Based on hydrology and vegetation and applies landscape position.



110

Eggers & Reed Classification System

Primarily based on plant communities, but includes "typical" associated hydrologic regimes

- Shallow, Open Water
- Deep Marsh
- Shallow Marsh
- Sedge Meadow
- Fresh (Wet) Meadow
- Wet/Wet-Mesic Prairie
- Calcareous Fen
- Open Bog/Coniferous Bog
- Shrub-Carr/Alder Thicket
- Hardwood Swamp/Coniferous Swamp
- Floodplain Forest
- Seasonally Flooded Basin

111

Circular 39	Eggers & Reed
1	Seasonally Flooded Basins
1	Floodplain Forests
2	Sedge Meadows
2	Fresh (wet) Meadows
2	Wet to Wet-Mesic Prairies
2	Calcareous Fens
3	Shallow Marsh
4	Deep Marsh
5	Shallow, Open Water
6	Shrub-Carr
6	Alder Thicket
7	Hardwood Swamp
7	Coniferous Swamp
8	Open Bog
8	Coniferous Bog

112

Eggers & Reed & WCA

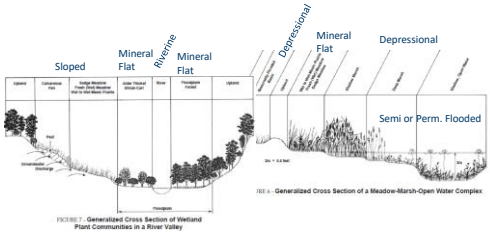
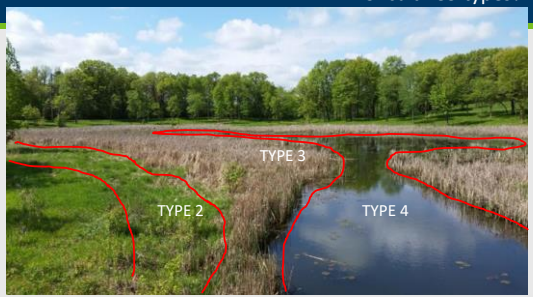


FIGURE 7. Generalized Cross Section of Wetland Plant Communities in a River Valley

FIG 6. Generalized Cross Section of a Meadow-Marsh-Open Water Complex

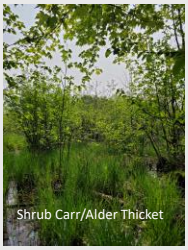
113

Circular 39 types?



114

Eggers & Reed?



115

Cowardin Classification System

- Created in 1979
- Includes wetlands and other aquatic habitats (streams, lakes, etc.)
- Used for NWI maps
- Nationwide system

116

Cowardin System

Hierarchy uses symbols to describe System, Class, plant community, hydrology and modifiers

Examples of common symbols:

Systems:
P = Palustrine, L= Lacustrine, R = Riverine

Palustrine Classes:
EM = Emergent, SS = Scrub shrub, FO = Forested

Plant Community:
EM: Persistent=1, Non persistent=2
SS & FO: Broad-leaved deciduous=1, Needle-leave deciduous= 2, Broad-leaved evergreen=3, Needle-leaved evergreen=4

Water regime modifiers:
A = Temporarily Flooded, B= Seasonally Saturated, C = Seasonally flooded, D= Continuously Saturated, F=semi-permanently flooded, G=Intermittently Exposed, H=permanently flooded

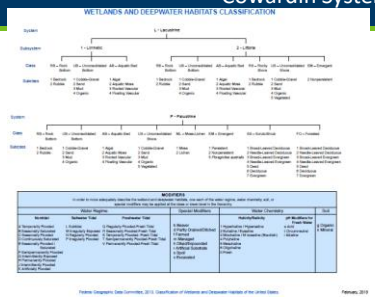
Special Modifiers:
b = Beaver, d = Partially Drained/Ditched, f = Farmed, x = Excavated

117

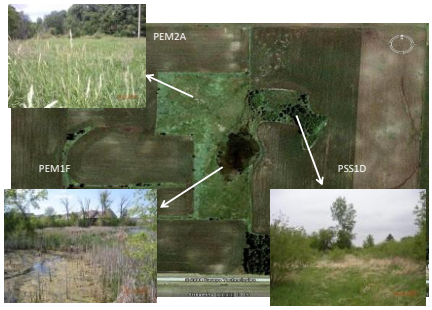
Cowardin System - NWI

118

Cowardin System - NWI



119



120

Wetland Classification Systems in Minnesota

Circular 39
- Based on hydrology and vegetation

Cowardin
- Based on hierarchy system, class, veg, water regime, special modifiers

Eggers & Reed
- Based on plant communities & "typical" associated hydrologic regimes

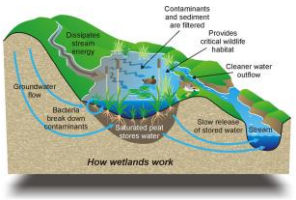
Hydrogeomorphic Method
- Based on landscape position, water source, hydraulics

Type 3, PEM1F, shallow marsh, DEPRESSION-surface

121

Wetland Functions and Values

- Functions- natural processes
  - Water quality, flood retention, habitat, groundwater recharge, carbon storage
- Values- provide monetary or social welfare benefit
  - Wild rice, recreation, education, aesthetics, fishing



122

Hydrology Indicators

Minnesota Wetland Professional Certification Program

123

Wetland Hydrology

1987 Corps Manual: "*The sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.*"

Regional Supplements: "*Wetland hydrology indicators are used in combination with hydric soil and hydrophytic vegetation to determine whether an area is wetland under the Corps manual.*"

124

Hydrology Technical Standard

…"inundated or saturated by surface or ground water at a frequency and duration"

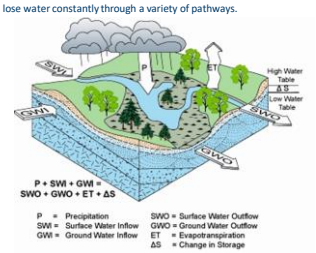
Technical standard if hydrology indicators not observed:

- 14 or more consecutive days of flooding or ponding;
- Water table 12 in. or less below soil surface;

125

Hydrology

Wetlands gain and lose water constantly through a variety of pathways.

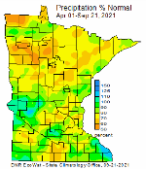


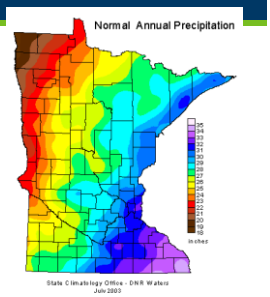
- Inputs
  - Precipitation
  - Surface water inflow
  - Groundwater inflow
- Outputs
  - Surface water outflow
  - Groundwater outflow
  - Evapotranspiration

126

Precipitation

- Average Annual precipitation varies significantly from one side of the state to the other
- A difference of 14 inches from Houston to Kittson





127

Hydrology Indicators

Evidence that there is continuing hydrology and confirms that an episode of inundation/saturation occurred recently.

Wetland hydrology indicators are divided into two categories:

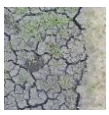
Primary – provide stand-alone evidence of a current or recent hydrologic event; and

Secondary – provide evidence of recent hydrology when supported by one or more other hydrology indicators.

128

Hydrology Indicator Groups

Group A – direct observation of *water*



Group B – evidence of *flooding/ponding*

Group C – evidence of *current or recent saturation*.

Group D – *Landscape and veg. characteristics* that indicate contemporary wetland conditions.

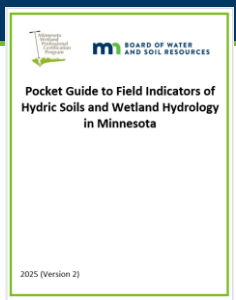
129

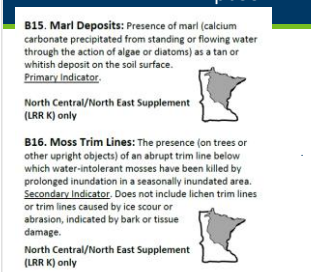
Land Resource Regions

Regions dictate which indicators are used and how they are used

130

Flipbook





131

Group A Indicators

Direct observation of *water*

132

A1: Surface water

Category: Primary

Direct, visual observation of surface water during a site visit.

Field Observations:

Surface Water Present?	Yes ____ No ____	Depth (inches):
Water Table Present?	Yes ____ No ____	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ____ No ____	Depth (inches):

133

A2: High water table

Category: Primary

Water table 12 in. (30 cm) or less below the surface in a soil pit, auger hole, or shallow monitoring well.

Field Observations:

Surface Water Present?	Yes ____ No ____	Depth (inches):
Water Table Present?	Yes ____ No ____	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ____ No ____	Depth (inches):

134

A3: Saturation

Category: Primary

Visual observation of saturated soil conditions 12 in. or less from the soil surface as indicated by water **glistening** on the surfaces and broken interior faces of soil samples.

Field Observations:

Surface Water Present?	Yes ____ No ____	Depth (inches):
Water Table Present?	Yes ____ No ____	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ____ No ____	Depth (inches):

*Must include water table observation.

135

Group B Indicators

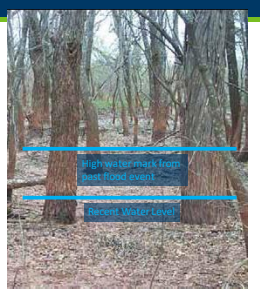
Evidence of ponding or flooding – past or present

136

B1: Water Marks

Category: Primary

Water marks are discolorations or stains on the bark of woody vegetation, rocks, bridge supports, buildings, fences, or other fixed objects as a result of inundation.



137

B2: Sediment Deposits

Category: Primary

Sediment deposits are thin layers or coatings of fine-grained mineral material or organic matter remaining on tree bark, plant stems or leaves, rocks, and other objects after surface water recedes

138

B3: Drift Deposits

Category: Primary

Drift deposits consist of rafted debris that has been deposited on the ground surface or entangled in vegetation or other fixed objects.

139

B4: Algal mat or crust

Category: Primary

This indicator consists of a mat or dried crust of algae, perhaps mixed with other detritus, left on or near the soil surface after dewatering.

140

B5: Iron deposits

Category: Primary

General Description: This indicator consists of a thin orange or yellow crust or gel of oxidized iron on the soil surface or on objects near the surface.

141

B6: Surface soil cracks

Category: Secondary

Water destroys the soil structure which facilitates the cracking. Surface soil cracks consist of shallow cracks that form when fine-grained mineral or organic sediments dry and shrink

142

B7: Inundation on aerial imagery

Category: Primary

One or more* recent aerial photographs or satellite images that show the site to be inundated during the growing season.

* Use Off-site Guidance Methods.

143

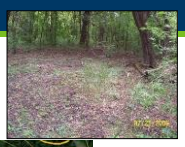
B8: Sparsely vegetated concave surface

Category: Primary. (Secondary in LRR F)

On concave land surfaces, the ground surface is either unvegetated or sparsely vegetated due to long-duration ponding during the growing season.

Sparsely vegetated concave surfaces should contrast with vegetated slopes and convex surfaces in the same area. Less than 5% ground cover.

Secondary



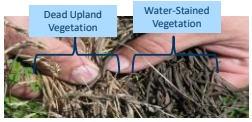
June

144

B9: Water-stained leaves

Category: Primary

Water-stained leaves are fallen or recumbent dead leaves that have turned grayish or blackish in color due to inundation for long periods.



145

B10: Drainage patterns

Category: Secondary

Flow patterns visible on the soil surface or eroded into the soil, low vegetation bent over in the direction of flow, absence of leaf litter or small woody debris due to flowing water

146

B15: Marl deposits

Category: Primary

Presence of marl on the soil surface.

Found mainly in calcareous fens, seeps, or white cedar swamps in areas underlain by limestone bedrock.

147

B16: Moss Trim Lines

Category: Secondary

Moss trim lines on trees or other upright objects in seasonally inundated areas.

Formed when water-intolerant mosses growing on tree trunks and other upright objects are killed by prolonged inundation.

148

Group C Indicators

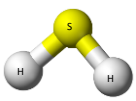
Evidence of soil saturation – past or present

149

C1: Hydrogen sulfide odor

Category: Primary

A hydrogen sulfide (rotten egg) odor within 12 in. of the soil surface.



150

C2: Dry season water table

Category: Secondary

Visual observation of the water table between 12 and 24 in. (30 and 60 cm) below the surface during the normal dry season or during a drier-than-normal year.

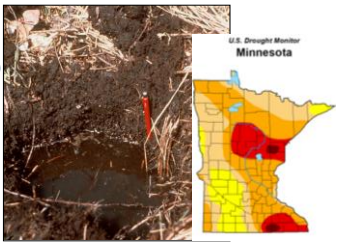
Dry Season Dates per Region:

Great Plains (F): July 1

Midwest (M): July 15

NC/NE)K): August 1

Reference: Corps of Engineers Drought Newsletter



151

C3: Oxidized rhizospheres along living roots

Category: Primary.

Secondary indicator in LRR F (GP) where soils are in tilled or plowed.

Presence of a layer containing iron-oxide coatings or plaques on the surfaces of living roots and/or iron-oxide coatings or linings on soil pores immediately surrounding living roots within 12 inches of the soil surface.

Secondary

152

C6: Recent iron reduction in tilled soils

Category: Primary

Redox concentrations as pore linings or soft masses in the tilled surface layer of soils cultivated within the last two years.

Must be within the plow layer

153

C8: Crayfish burrows

Category: Secondary

General Description: Presence of crayfish burrows, as indicated by openings in soft ground up to 2 in. (5 cm) in diameter, often surrounded by chimney-like mounds of excavated mud.

Secondary

154

C9: Saturation visible on aerial imagery

Category: Secondary

One or more* recent aerial photographs or satellite images indicate soil saturation. Saturated soil signatures must correspond to field-verified hydric soils, depressions or drainage patterns, differential crop management, or other evidence of a seasonal high water table.

* Use Off-site Guidance Methods.

155

Group D Indicators

Landscape and vegetation characteristics that indicate contemporary wet conditions

156

D1: Stunted or stressed plants

Category: Secondary

This indicator is present if individuals of the same species growing in the potential wetland are clearly of smaller stature, less vigorous, or stressed compared with individuals growing in nearby non-wetland situations.

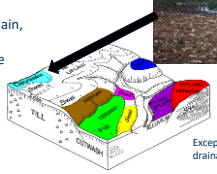
This indicator is applicable to natural plant communities as well as agricultural crops and other introduced or planted vegetation. For this indicator to be present, a majority of individuals in the stand must be stunted or stressed.

157

D2: Geomorphic position

Category: Secondary

This indicator is present if the area in question is located in a localized depression, linear drainageway, concave position within a floodplain, at the toe of a slope, on the low-elevation fringe of a pond or othe water body, or in an area where groundwater discharges.



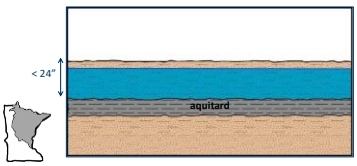
Except where a functioning drainage system exists!

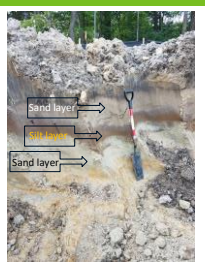
158

D3: Shallow Aquitard

Category: Secondary

Presence of an aquitard within 24 in. of the soil surface that is potentially capable of perching water within 12 in. of the surface.





159

D4: Microtopographic relief

Category: Secondary

Microtopographic features that occur in areas of seasonal inundation or shallow water tables:

- Hummocks
- Tussocks
- Flark-and-strang topography

- Microhighs < 36 in. above the base soil level

160

D5: FAC – neutral test

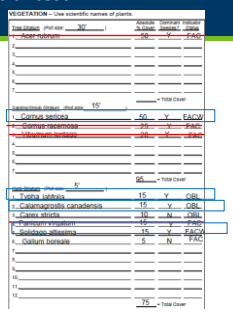
Category: Secondary

The plant community passes the FAC-neutral test:

1. Compile list of dominant plant species across all strata
2. Drop any with FAC
3. >50 % of remaining dominant species are FACW and/or OBL

If it's an equal number of each, then use non-dominant

*This indicator uses the longer-term nature of plants



Does this pass?
Yes, 100% remaining species are FACW or OBL

161

Indicator D7: Frost-heave hummocks

Category: Secondary

This indicator consists of hummocky microtopography produced by frost action in saturated wetland soils.

162

Hydrology Indicators

Take home message

- Wetland hydrology is dynamic
- Indicators prove current or recent evidence of hydrology
- Proof = minimum of 1 Primary or 2 Secondary
- Lack of indicator(s) does not confirm absence of wetland hydrology! CH 5 (Difficult Wetland Situations) is a "must read"

163

Hydrology Indicators?

164

Critical Definitions for Wetland Delineation

165

Critical Definitions

- Wetlands
- Deepwater Aquatic Habitat
- Semipermanently and permanently flooded
- Growing Season
- Disturbed (Atypical Situations)
- Naturally Problematic (Problem Areas)
- Normal Environmental Conditions
- Normal Circumstances

166

Two-Step Process

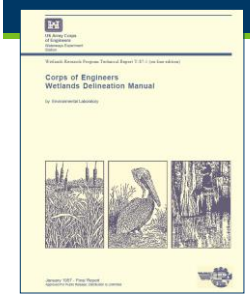
Step 1: Delineate Wetlands, if Present, Within a Site

Every Data Sheet:
- Normal Circumstances?
- Normal Environmental Conditions?
- Disturbed (Atypical Situations)?
- Problem Area (Naturally Problematic)?

Step 2: Apply regulations, policy and guidance

167

Definitions



168

Chapter 5- Difficult Wetland Situations

- Atypical situations
  - Agricultural Land (NE/NC, Midwest)
  - Silviculture (NC/NE)
- Problem areas
  - Problematic vegetation
  - Problematic soil
  - Seasonal hydrology
- Procedural problems
  - Wetland/non-wetland mosaics

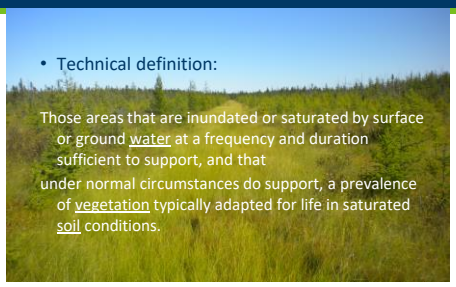
169

What is a Wetland?

"Wetlands are sometimes wet areas where people meet to argue."

Greg Larson

170



171

Deepwater Habitat

Deepwater aquatic habitats are areas that are permanently inundated at mean annual water depths >8.2 ft or permanently inundated areas less than or equal to 8.2 ft that do not support rooted-emergent or woody plant species

They have the follow diagnostic characteristics:

1) vegetation- no rooted-emergent or woody plant species are present in these permanently inundated areas

2) Soil- the substrate technically is not defined as a soil if the mean water depth is >8.2 ft or if it will not support rooted emergent or woody plants

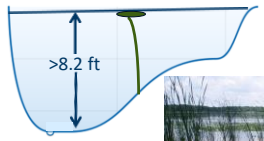
172

Limits of wetland (depth)- Deepwater Habitat

Important Considerations for Wetlands

- Must be capable of supporting rooted, emergent vegetation.
- Must have soil.

If the water is too deep or fast flowing, cannot support rooted vegetation and soil cannot form (unconsolidated bottom).



Wetland Water Depth Guidance

173

Permanently and Semipermanently flooded areas

- 2009 Rule language:
- Subp. 51. **Permanently and semipermanently flooded area of a ~~type 3, 4, or 5~~ wetland.** "Permanently and semipermanently flooded area of a ~~type 3, 4, or 5~~ wetland" means the portion of a ~~type 3, 4, or 5~~ wetland below the level where the water has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

174

Permanently and Semipermanently flooded areas- Circular 39 & Eggers & Reed

Circular 39	Eggers & Reed
1	Seasonally Flooded Basins
1	Floodplain Forests
2	Sedge Meadows
2	Fresh (wet) Meadows
2	Wet to Wet-Mesic Prairies
2	Calcareous Fens
3	Shallow Marsh
4	Deep Marsh
5	Shallow, Open Water
6	Shrub-Carr
6	Alder Thicket
7	Hardwood Swamp
7	Coniferous Swamp
8	Open Bog
8	Coniferous Bog

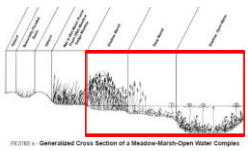


FIGURE 4 - Generalized Cross Section of a Meadow-Marsh-Open Water Complex

175

Permanently and Semipermanently Flooded areas- Cowardin

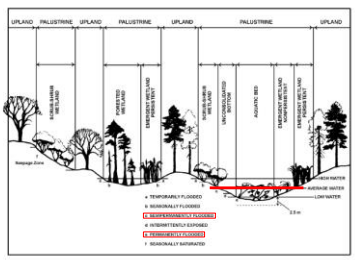


Figure 6. Distinguishing features and examples of habitats in the Palustrine System.

- Depression

A Temporarily Flooded
B Seasonally Saturated
C Seasonally Flooded
D Continuously Saturated
E Seasonally Flooded / Saturated
F Semipermanently Flooded
G Intermittently Exposed
H Permanently Flooded
J Intermittently Flooded
K Artificially Flooded

176

Lacustrine Fringe

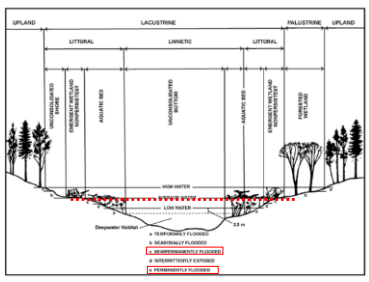


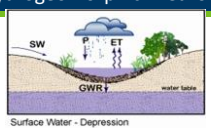
Figure 5. Distinguishing features and examples of habitats in the Lacustrine System.

A Temporarily Flooded
B Seasonally Saturated
C Seasonally Flooded
D Continuously Saturated
E Seasonally Flooded / Saturated
F Semipermanently Flooded
G Intermittently Exposed
H Permanently Flooded
J Intermittently Flooded
K Artificially Flooded

177

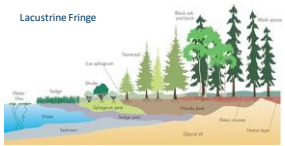
permanently and semipermanently flooded areas- Hydrogeomorphic Method

HGM Class	Typical Water Regimes
Mineral Flat	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	Saturated
Sloped	Saturated
Riverine	Temporary Flooded
Lacustrine Fringe	Semi permanently to permanently flooded (up to 8.2')
Depression	Seasonally Flooded
Depression	Saturated
Depression	Semi permanently flooded (up to 6")



Surface Water - Depression

Lacustrine Fringe



178

Mapping flooded areas

Nontidal

A Temporarily Flooded
B Seasonally Saturated
C Seasonally Flooded
D Continuously Saturated
E Seasonally Flooded / Saturated
F Semipermanently Flooded
G Intermittently Exposed
H Permanently Flooded
J Intermittently Flooded
K Artificially Flooded

179

Why do we care about Growing Season?

Growing season dates are needed to:

- Evaluate and interpret certain wetland hydrology indicators
- Analyze recorded data to determine if wetland hydrology criterion is met

180

Indicators of Start of the Growing Season

1. **Soil temperature at 12 inches is 41° F. or higher**

Use a compost thermometer for each site

Research & Outreach Centers | College of Food, Agricultural and Natural Resource Sciences (umn.edu)

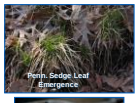
https://www.mda.state.mn.us/protecting/soilprotection/soiltemp

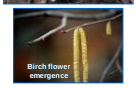
2. **"Green-up" indicator**

181

"Green-Up" Indicator for Start of Growing Season

Two or more species of non-evergreen plants show active growth in a wetland or surrounding area with similar elevation and aspect





182

Start of Growing Season

April site visit:

Two species of non-evergreen plants – reed canary grass and lake sedge – have new, green, aerial leaf/stem growth

Meets the "green-up" indicator for the start of the growing season

183

End of Growing Season

- woody deciduous species lose their leaves

and/or

- the last herbaceous plants cease flowering and their leaves die back

184

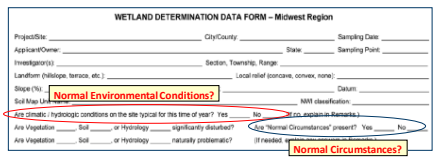
Normal Circumstance

- Those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions

HISTORY: In early years of implementing the Section 404 regulatory program, wetland identification was based on vegetation – there were no delineation manuals/3-parameter approach. Cases arose where wetland vegetation was removed (plowed under, burned off, herbicided, etc.) in an attempt to evade wetland regulations. Corps/EPA then adopted the approach of determining whether the area in question would support dominance by wetland vegetation under normal circumstances.

185

Normal Environmental Conditions vs. Normal Circumstances



186

Normal Environmental Conditions vs. Normal Circumstances

- **Short-term:** "normal environmental conditions" refers to the climatic conditions of the current year and growing season
- **Long-term:** "normal circumstances" refers to the multiple-year/decades-long condition of the site

187

Normal Circumstances

WETLAND DETERMINATION DATA FORM – Midwest Region

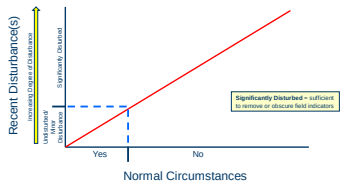
Project/Site: _____ City/County: _____ Sampling Date: _____
Applicant/Owner: _____ State: _____ Sampling Point: _____
Investigator(s): _____ Section, Township, Range: _____
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____
Slope (%): _____ Lat: _____ Long: _____ Datum: _____
Soil Map Unit Name: _____ NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

If "Yes", data collection is based on current conditions.

If "No", data collection is based on conditions that would exist in absence of recent disturbance(s).

188

Relationship of Normal Circumstances and Recent Disturbance(s)



189

Not Normal Circumstances

Recent, unauthorized fill that buried natural vegetation and native soils, and altered hydrology

190

Normal Circumstances - Hydrology

Example A: Ditch legally constructed in 1950s and maintained since = ditch is established as **Normal Circumstances**. Partially drained is the normal circumstance for hydrology.

Example B: Ditch constructed last year; unauthorized side casting of fill materials in wetlands = **NOT Normal Circumstances**

191

Normal Circumstances

Authorized wetland fill meets the "extent and relative permanence test" -- establishes a new Normal Circumstance

3. Physical alteration(s) is legally established, maintained and represents the long-term condition of the site; OR is a newly-authorized physical alteration (e.g., a permitted fill, new concrete dam).....**Normal Circumstances**

192

Normal Circumstances – Soils

- **Normal plowing** (e.g., 8- to 9-inch depth) is not considered a "significant" disturbance to soils if does not remove or obscure field indicators of hydric soils
  - -- Examples: A1, A12
  - -- However, other field indictors (e.g., F8, some S indicators (sandy))
    would be obscured or difficult to determine
- "Deep ripping" or other methods that disturb and mix soil layers at depths greater than normal plowing are **NOT Normal Circumstances**

193

Normal Circumstances - Vegetation

Removal of natural vegetation and replacement with a planted crop = NOT Normal Circumstances

IGNORE the planted crop for purposes of the hydrophytic vegetation determination

When natural vegetation has been removed, focus on soils and hydrology. If a site has wetland hydrology and hydric soils, it would support dominance by hydrophytes under normal circumstances.

194

Normal Circumstances - Vegetation

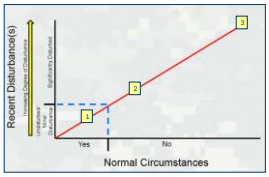
Light grazing of a sedge meadow – minor disturbance of natural vegetation = Normal Circumstances

Example of an unimproved pasture = no interseeding, planting, etc.

195

Normal Circumstances - Vegetation

What about moderate grazing sufficient to result in a shift of the plant community to species more tolerant of grazing ("increasers") at the expense of other plant species ("decreasers")[see Table 10 in Midwest Supplement for examples]. Most cases: NOT Normal Circumstances. Follow Midwest Supplement guidance.



KEY:
1 Light Grazing – Sedge Meadow
2 Moderate Grazing
3 Overgrazed – Exposed Soils

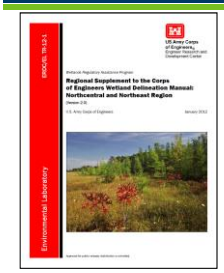
196

Normal Circumstances - Vegetation

Natural vegetation removed and replaced by manipulated/manicured vegetation (seeding, mowing, fertilizing, selective herbicide applications) = NOT Normal Circumstances

197

Disturbed (Atypical Situations)

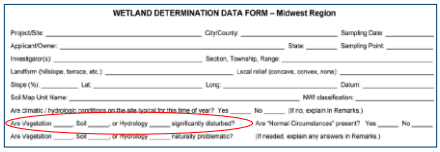


- **One or more parameters altered or absent due to recent human activities or natural event**

Filling, artificial drainage, stream channelization, mechanized land clearing, levee construction, mowing, cropping, plowing, logging, change in river course, high-capacity groundwater well pumping, tree farms, etc.

198

Degree of Disturbance(s)



WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

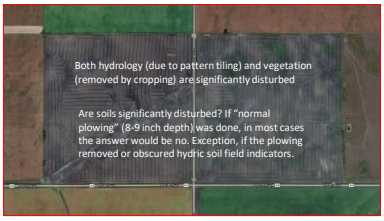
Significantly Disturbed = sufficient to remove or obscure field indicators

199

Disturbed (Atypical)

200

Disturbed (Atypical)



201

Problem Areas (Naturally Problematic)

- **One or more parameters are absent due to normal seasonal or annual variability, or permanently due to the nature of the soils or plant species**
  - Seasonal wetlands
  - Prairie potholes
  - Red clay parent materials
  - FACU-dominated wetlands
  - Inter-dunal swales

202

Problem Areas

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____

Slope (%): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

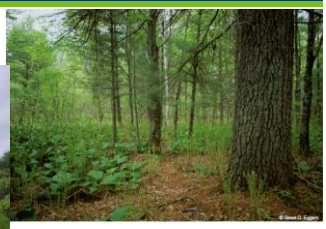
203

Seasonal Wetlands

204

Problem Areas

Wetlands dominated by non-hydrophytic species like white pine, a Facultative Upland (FACU) species



205

Problem Areas and Normal Circumstances

- **EXAMPLE:** Vernal pools are naturally dry outside of the first few weeks of the growing season = **Normal Circumstances**

206

Problem Areas and Normal Circumstances

Project/Site: _____ City/County: _____ Sampling Date: _____
Applicant/Owner: _____ State: _____ Sampling Point: _____
Investigator(s): _____ Section, Township, Range: _____
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____
Slope (%): _____ Lat: _____ Long: _____ Datum: _____
Soil Map Unit Name: _____ NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology X naturally problematic? (If needed, explain any answers in Remarks.)

Prairie pothole wetland in a drought year

207

Normal Circumstances?

208

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: _____ City/County: _____ Sampling Date: _____
Applicant/Owner: _____ State Sampling Point: _____
Investigator(s): _____ Section, Township, Range: _____
Landform (hillside, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope %: ____
Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
Soil Map Unit Name: _____ NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____ No X	
Wetland Hydrology Present?	Yes ____ No X	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

209