Source Waters, Soils, and Wetlands

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Presented by: Stacey Clark, Regional Ecologist
1. How Source Waters and Soils Define the Character of a Wetland

2. Introduction to HGM
   - What it is
   - What it can tell you
   - How it can be used
   - What planners should know and when they should ask for help
Defining a “Wetland”

1. Water is present at the soil surface or within the rooting zone;
2. Soil conditions are unique and differ from “uplands”;
3. Hydrophytic vegetation present, flooding-intolerant biota absent

What causes water to be present at the soil surface or within the rooting zone?

1. Depth to water table
2. Soil textures/particle size
3. Restrictive layers
   - Fragipans
   - Bedrock
   - Abrupt textural changes
4. Frequency and intensity of water inputs

→ These things affect rate of infiltration, available water holding capacity, residence time, flooding frequency, and ponding depth and duration.
Soil Properties Indicative of Wetlands

- Color/Chroma
- Presence of redoximorphic features
- Flooding frequency
- Ponding duration
- Shallow depth to water table

These properties combine to drive anaerobic conditions, soil saturation within the rooting zone, and potential presence of water at the surface of the soil for periods of time throughout the growing season.
Wetland and Riparian Classification Systems and Resources

Cowardin/USFWS (Cowardin et al. 1979)
- USFGDC 2013 revision

HGM (Brinson 1993)
- Regional Guidebooks
- Functional Assessments

Ecological Site Descriptions (NRCS)
- Web Soil Survey
- Field Office Technical Guides
- Ecological Site Information System (ESIS)

Rosgen Stream Classification (Rosgen 1996)

Other
- State Agency/Heritage Programs
- Local Publications (Eggers/USACE 1997)
“Hydrogeomorphic”

• **Hydrology - the study of water**
  – flow of water
  – characteristics of flow
  – interaction with the wetland

• **Geomorphology - the study of the earth’s surface and its formation**
  – the contours of the earth’s surface and how that “depression” got there

• **Geomorphic setting**
  – the landform of a wetland (depressional, valley, interfluve)
  – geologic evolution (layering of geologic and soil materials, which affect water flow)
  – topographic position in a landscape (top, middle or bottom of a watershed; stream order)
Introduction to Hydrogeomorphic (HGM) Classification

Objectives:

- Use technically sound information and terminology to document hydric soils and potential wetlands
- Understand and explain where (and why) hydric soils and wetlands are likely to occur on the landscape
- Using your knowledge of landscapes, soil, and hydrology, identify potential sources of water into the wetland

These things will make you a more informed and effective communicator and conservation planner.


National and Regional Guidebooks:
https://wetlands.el.erdc.dren.mil/guidebooks.cfm

JMENTS/nrcs143_010784.pdf
Hydrogeomorphic Classification is Based on Three Factors

- Geomorphic Setting
- Water Source including climatic setting
- Hydrodynamics
The Seven HGM Classes

- RIVERINE
- SLOPE
- MINERAL SOIL FLAT
- ORGANIC SOIL FLAT
- ESTUARINE FRINGE
- LACUSTRINE FRINGE
- DEPRESSION

Depressional: Carolina Bay
Estuarine Fringe: Oregon
Slope: Puerto Rico
Mineral Flats: Indiana Flatwoods
RIVERINE

Occur in floodplains/riparian corridors in association with stream channels (Cowardin palustrine wetlands on floodplains)

Landscape Position
- **Floodplains**

Dominant Water Source
- **Surface Flooding/Overbank Flow**
- **Groundwater Inputs/Lateral hydraulic connection with stream**

Hydrodynamics
- **Horizontal, Bi-Directional**
Topographic and Stratigraphic

**Landscape Position**
- **Concave Topographic (Headwaters)**
- **Slopes above restrictive layers**

**Dominant Water Source**
- **Groundwater**

**Hydrodynamics**
- **Horizontal,**
- **Bi-Directional**

*Impermeable strata*
MINERAL SOIL FLAT

Landscape Position
- Broad interfluves*
- Extensive relic lakes
- Large historic floodplain terraces

Dominant Water Source
- Direct Precipitation

Hydrodynamics
- Vertical

*uppermost level area of a hill

Maintenance of saturation and shallow ponding (Lateral effects equations apply)
**Organic Soil Flat**

**Landscape Position**
- Flat interfluves
- Depressions with enough peat to be flat

**Dominant Water Source**
- Precipitation

**Hydrodynamics**
- Vertical

*Category 1 Wetlands, because they are impossible to recreate through compensatory mitigation.*
ESTUARINE FRINGE

Under the influence of sea level

Landscape Position
- Coasts
- Estuaries

Dominant Water Source
- Tides

Hydrodynamics
- Bidirectional

* Category 1 wetlands because they are relatively rare/limited and provide unique natural resources that are considered to be valuable to society.
LACUSTRINE FRINGE

**Landscape Position**
- Adjacent to lakes

**Dominant Water Source**
- Lake fluctuations

**Hydrodynamics**
- Bidirectional
- Horizontal

Maintain terrestrial animal communities and breeding grounds
DEPRESSIONAL

Landscape Position
• Topographic depressions

Dominant Water Source
• Surface Runoff
• Groundwater
• Precipitation

Hydrodynamics
• Vertical (seasonal)
• May have any combination of inlets and outlets, or lack them entirely

Photo courtesy of Richard Weber
DEPRESSIONAL

Recharge

Discharge or Flow-through

Image courtesy of Richard Weber

Image courtesy of Richard Weber
HGM Subclasses

- Provides more detail into the characteristics of the wetland and primary hydrologic influence
- Based on morphology, water source, and/or hydrodynamics
- Can be single-phase or multi-phase
- Terms can include:
  - alluvial plain, basin, lowland, arroyo, barrier flat, bog, fen, oxbow, slough, terrace, pothole, interdune, recharge, discharge, flow-through, etc.

Examples:
- “DEPRESSIONAL—recharge”
- “RIVERINE—oxbow”
- “MINERAL FLAT—alluvial plain”
- “SLOPE—fen”
How HGM Can Be Used

• Ecological Site Descriptions
• HGM Models/Functional Assessments/Minimal Effects
• Wildlife Habitat Restoration (Initiatives)
• Conservation Planning
• NEPA Evaluations
• Program Allocation and Prioritization

Texas Playas – DEPRESSIONAL, Recharge
Soil: Randall Clay
HGM Challenges

Common Challenges, and When to Seek Expert Advice:

1. Difficulty differentiating between wetland type(s)
   - “tweeners”, gradation, lack of information

2. Identification of Subclasses for site-level planning;
3. Development of functional assessment models at the local level;
4. Evaluation of models for minimal effects determinations;
5. Whenever you are not sure about what you are doing!

If this pond is recharge, I’m going down…
Summary

What Planners Should Understand:

1. **What landforms and landscape positions are, and how they affect wetland type;**

2. **Soil properties** that are characteristic of wetlands;

3. Potential **sources of water** for wetlands;

4. **Functions, Values, and Ecosystem services** that are unique to wetlands;

5. Differences between **wetland types** and their **functions**;

6. How to obtain **data** needed to identify **wetland type(s)**