

Using Soil Attributes for HGM Wetland Classification

Richard Weber
Wetland Hydraulic Engineer
Wetland Team
CNTSC, Fort Worth, TX



Hydrogeomorphic (HGM) Landscape Classes



US Army Corps
of Engineers®
Engineer Research and
Development Center

A Regional Guidebook for Applying the
Hydrogeomorphic Approach to Assessing
Wetland Functions of Riverine Floodplains
in the Northern Rocky Mountains

August 2002

- Originally for Development of “Functional Assessment Models” (Brinson, et. al.)
- Starts with 7 Wetland Classes
- Requires the Determination of a “Reference Domain” where a certain “subclass” exists
- Function Based



ENV



FHWA



USDA NRCS

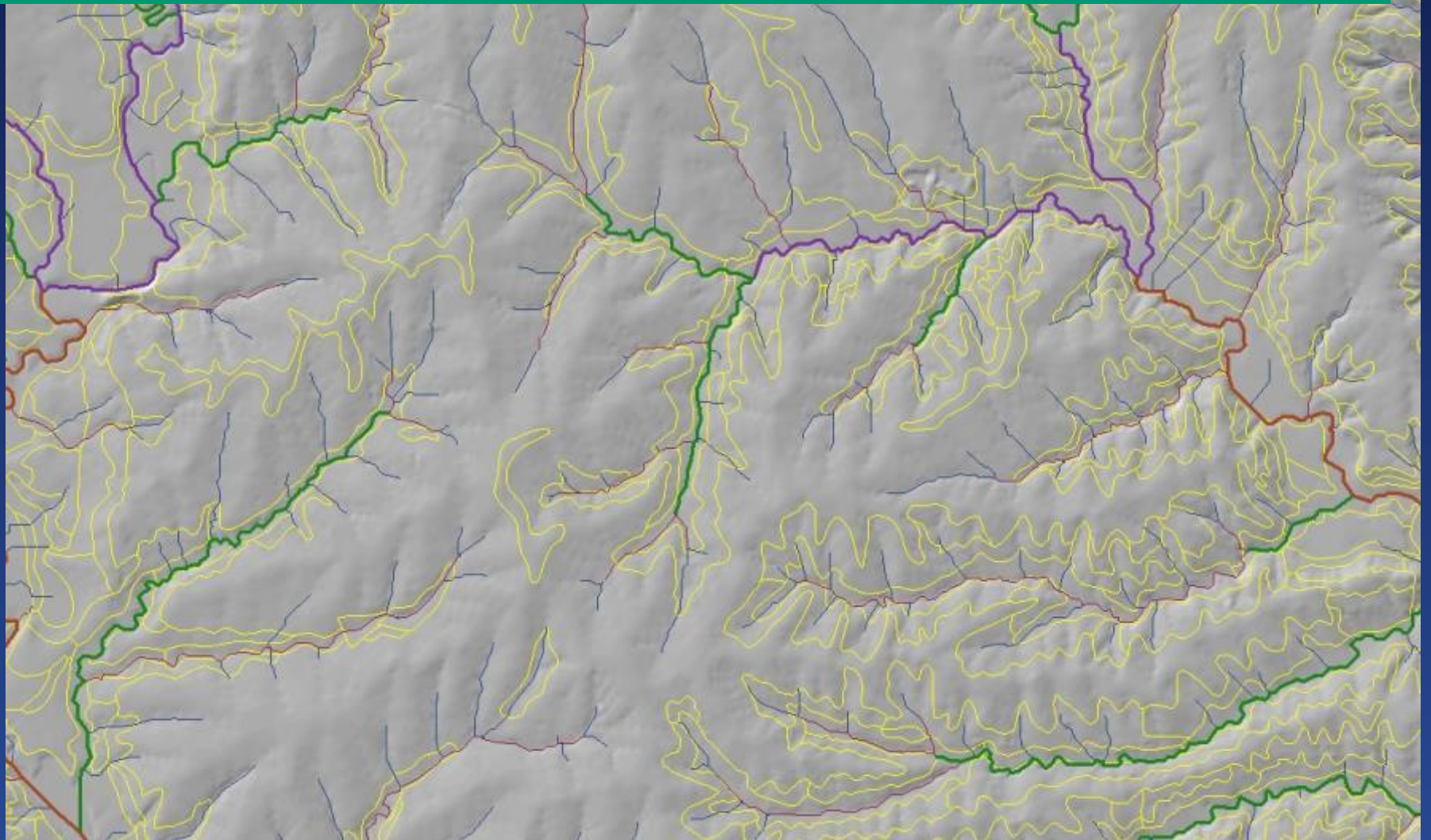


Three Factors that Define HGM *Landscape* Classes

- **Landscape Position** *in watershed*
- **Dominant Water Source**
- **Hydrodynamics**
- **These are Soil Attributes**



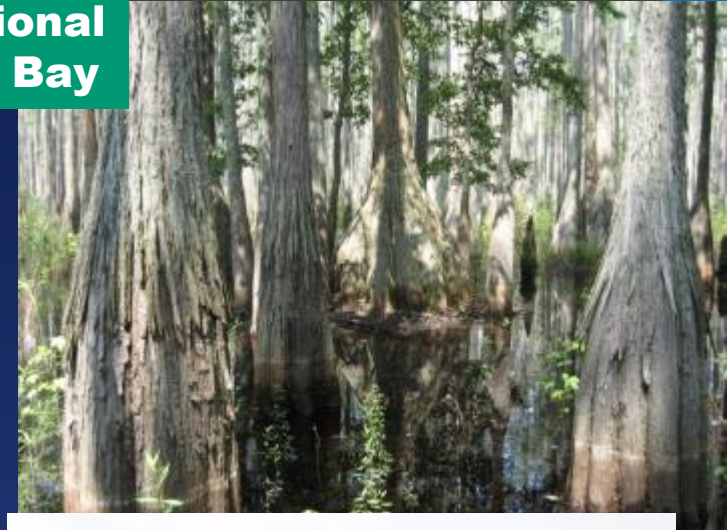
Map Unit Polygons – Also Occupy Landscape Positions *in the Watershed*



The Seven HGM Classes

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

**Depressional
Carolina Bay**



**Estuarine Fringe
Oregon**



**Mineral Flats
Indiana Flatwoods**



**Slope
Puerto Rico**



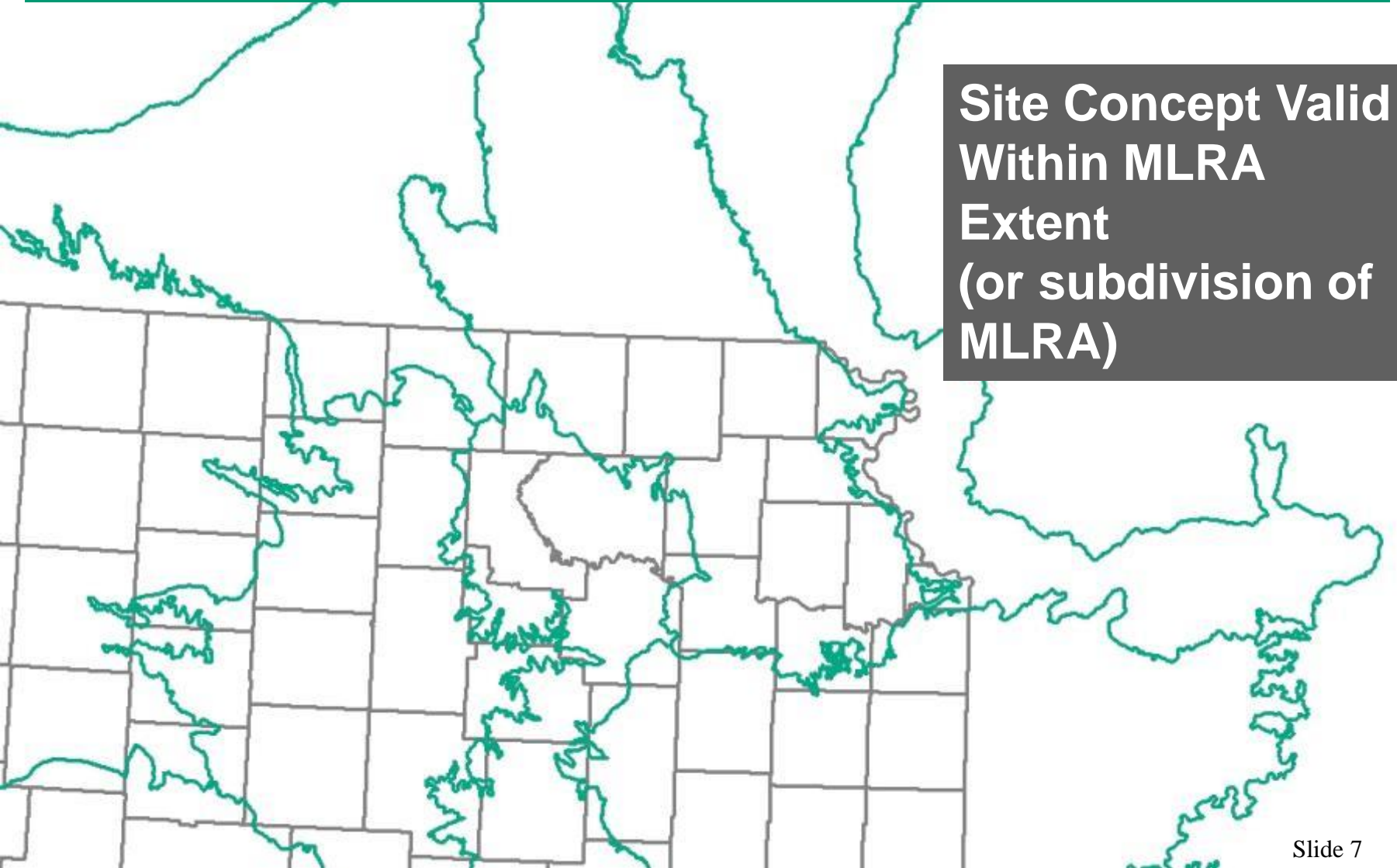
Subclasses in a local Reference Domain

The Reference Domain



- The area within which a defined Subclass Exists
- Major Land Resource Area is a Good Default
- MLRA Subdivisions may Exist for Further Refinement

Major Land Resource Areas



**Site Concept Valid
Within MLRA
Extent
(or subdivision of
MLRA)**

Some Useful Soil Attributes from SSURGO:

- **Geomorphic Description**
- **Drainage Class**
- **Slope Class**
- **Taxonomy**
- **Water Features**
 - **Flooding Freq. and Dur.**
 - **Ponding Freq. and Dur.**
 - **Groundwater Depths**

Useful Database Tables:

- **Component**
- **Map Unit**
- **Map Unit Aggregated Attributes (muaggat)**

Digital Elevation Data
Can be used also to
Aggregate and Dis-Aggregate
Map Units

Beyond our Scope Today...

Selection by Attributes

- SSURGO Vector Polygons
- Site or HUC-12 Scale
- “Heads-up” Mapping

Red

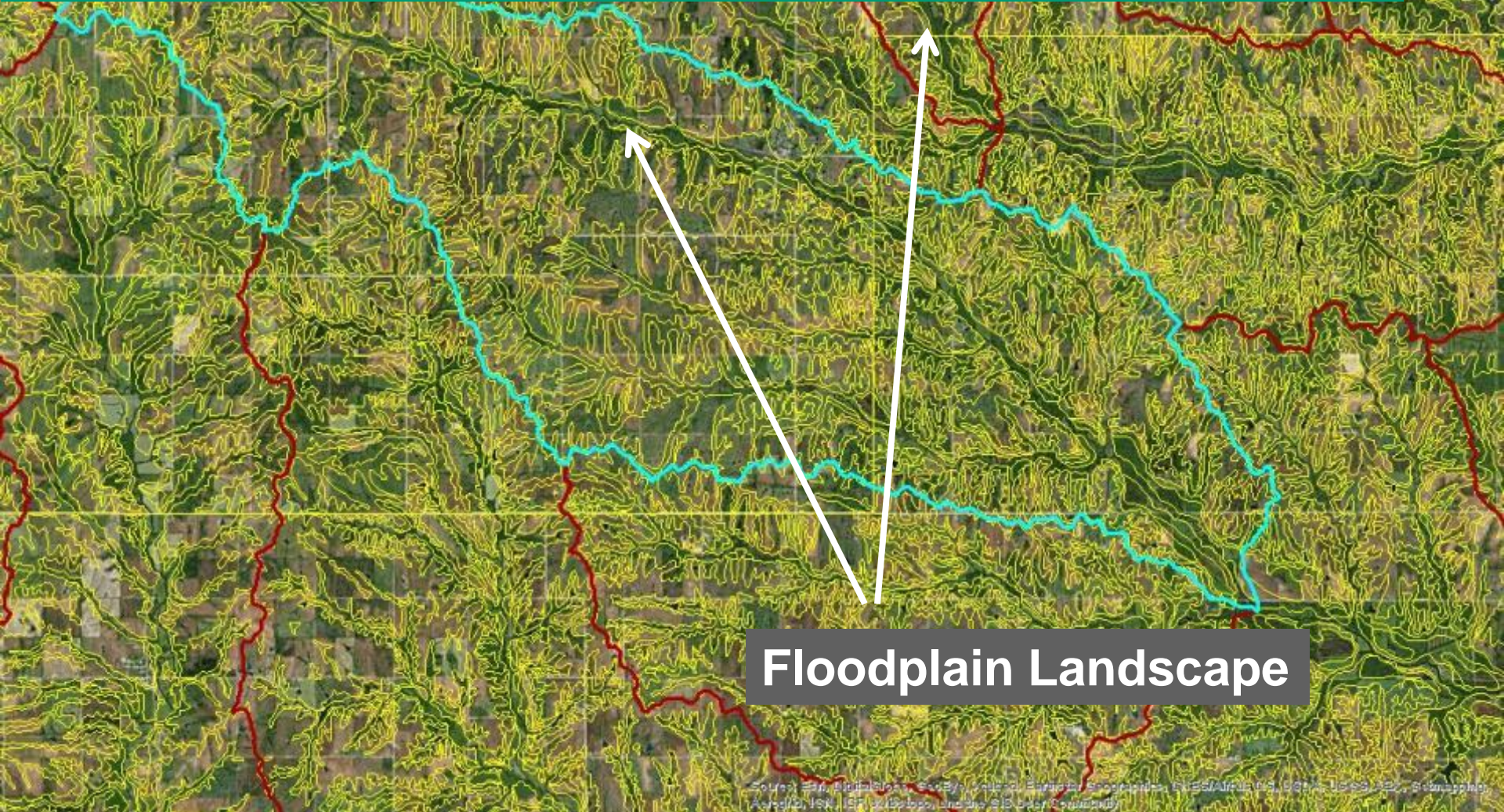
- Calcareous Wet Prairie
- MINERAL FLAT

Green

- Calcareous Marsh
- DEPRESSION

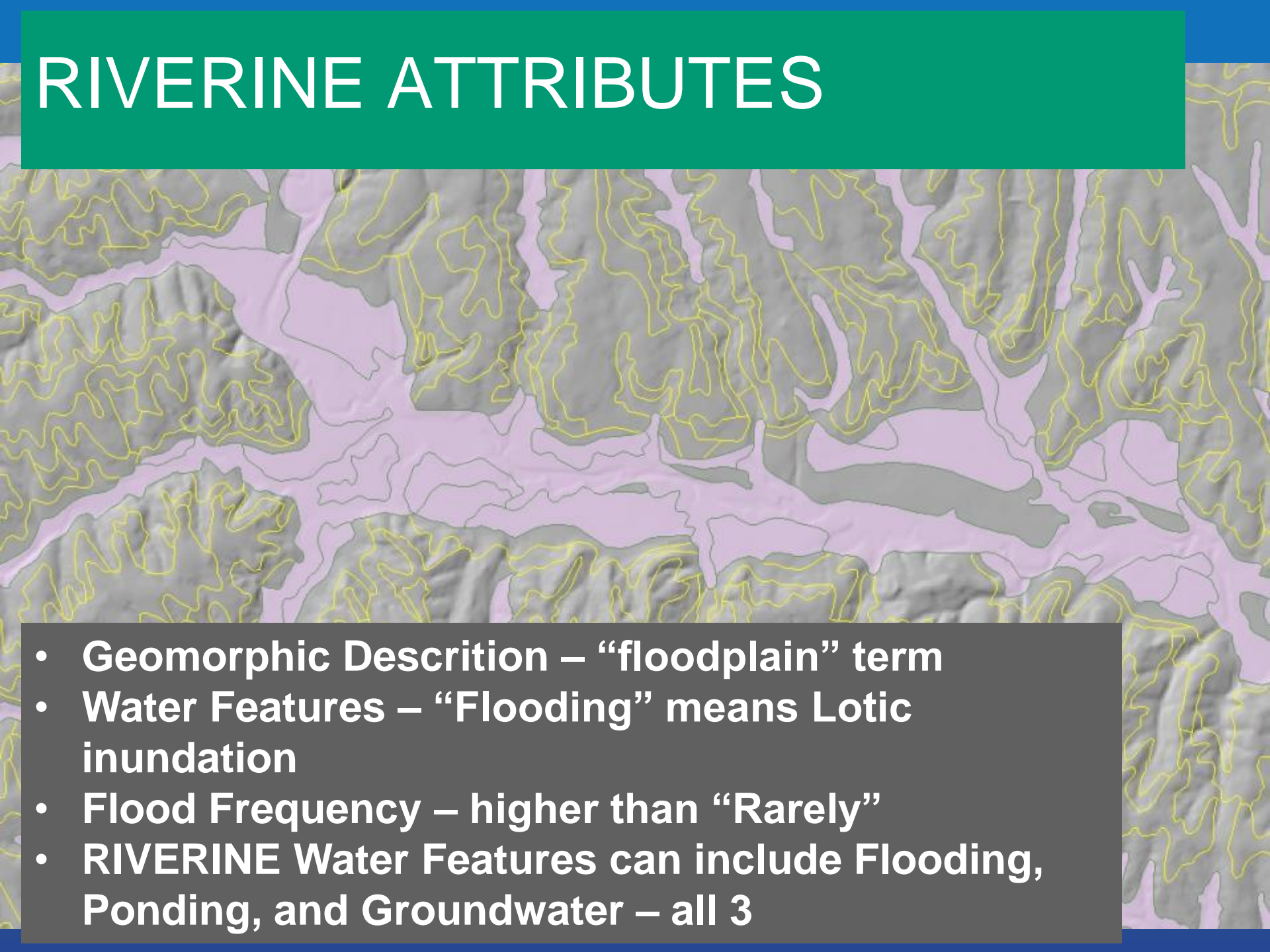
HUC -12 Scale

- Large Enough to Display all HGM subclasses
- Small Enough to Visualize



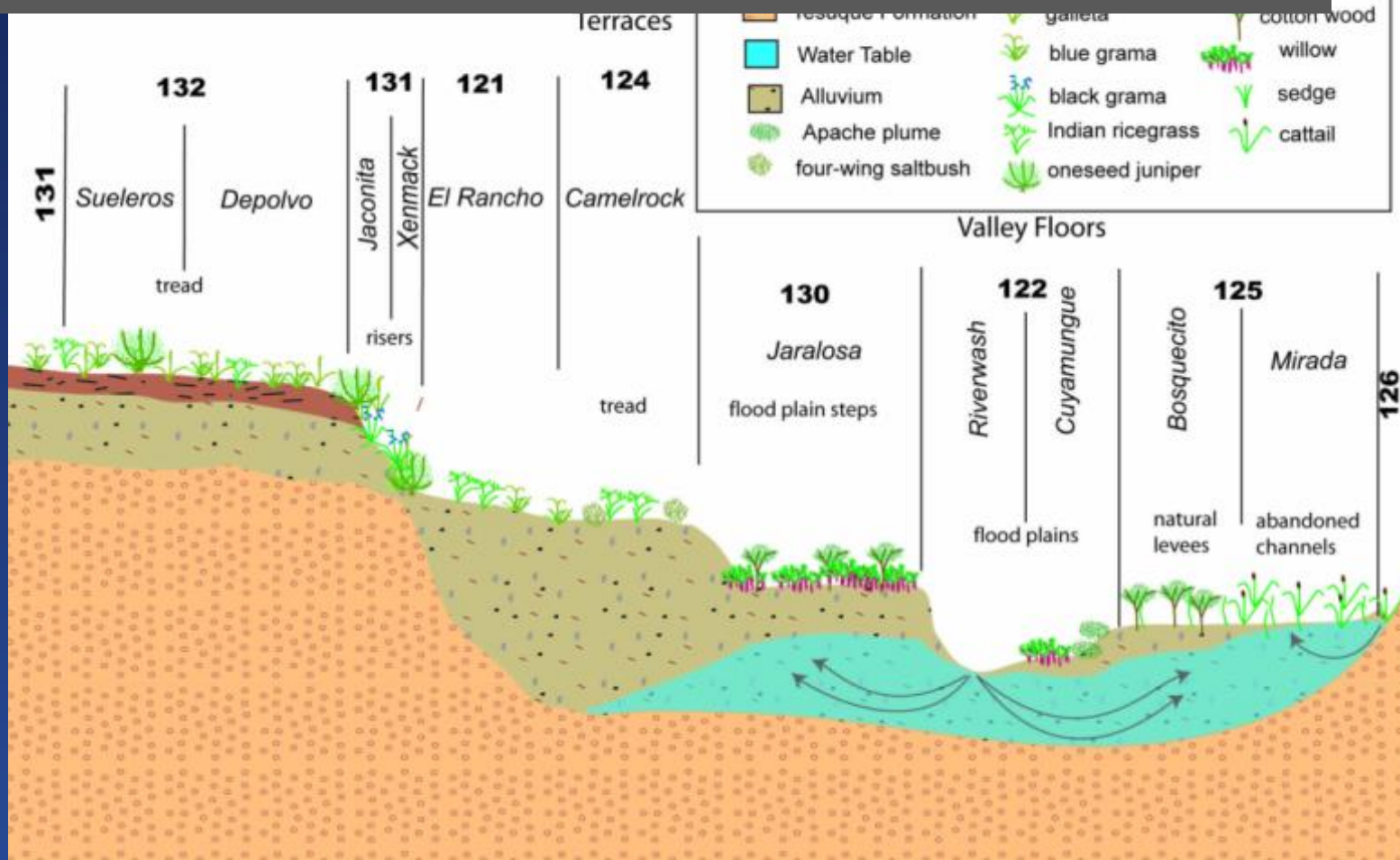
Floodplain Landscape

RIVERINE ATTRIBUTES

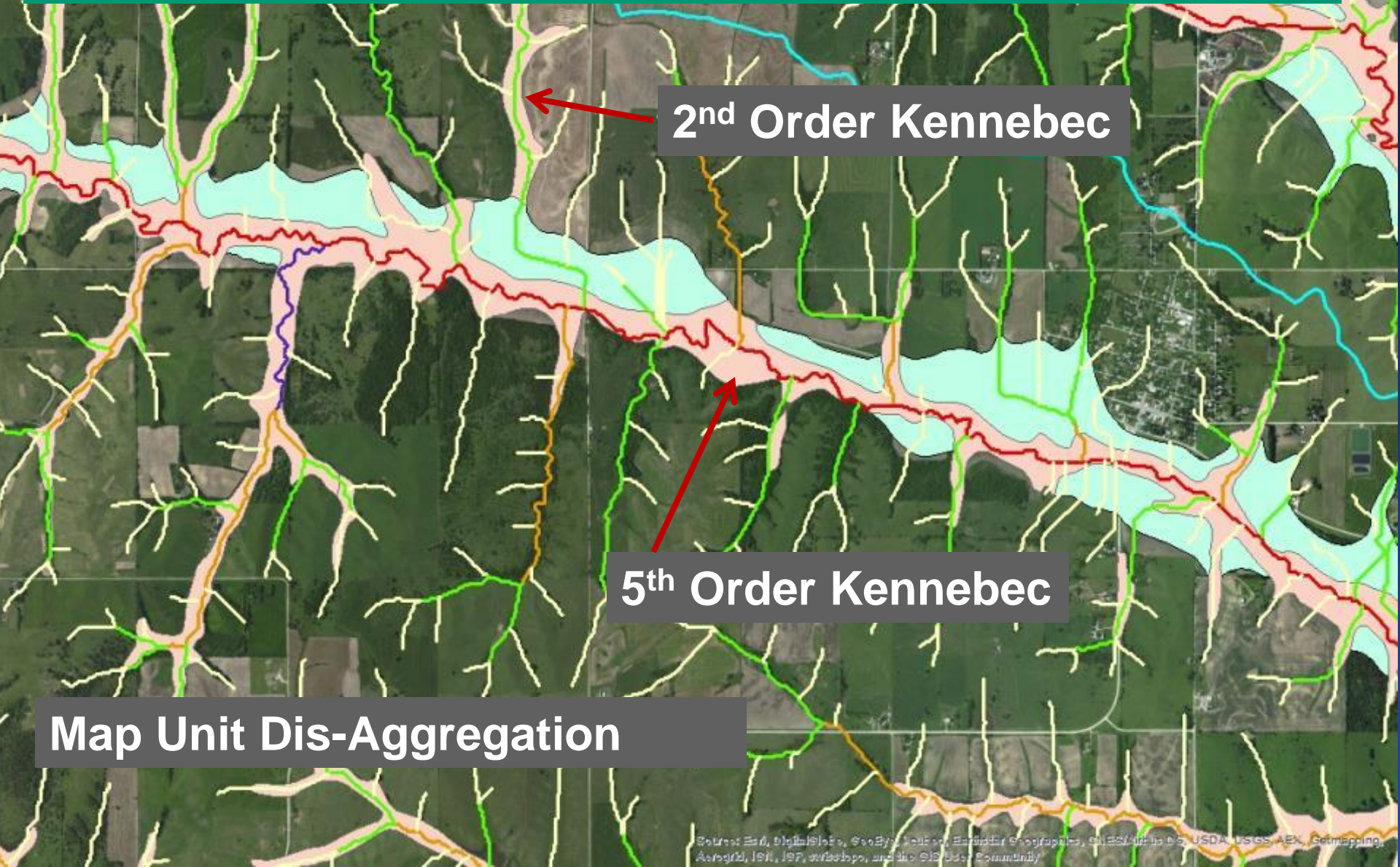
- 
- A topographic map showing a river network. The map uses a color gradient from light purple to dark grey to represent elevation. Yellow lines trace the paths of rivers and streams, showing a complex, branching network. The background is a textured, shaded relief map.
- **Geomorphic Description** – “floodplain” term
 - **Water Features** – “Flooding” means Lotic inundation
 - **Flood Frequency** – higher than “Rarely”
 - **RIVERINE Water Features** can include Flooding, Ponding, and Groundwater – all 3

RIVERINE Soil System – Multiple HGM Sub-Classes

- Look for more geomorphic description detail – Ex. – “Backswamps, Natural Levees, Oxbows on Floodplains”
- Look for more Water Features. Ex. – “Ponding” means it’s a backswamp



Problem! – Stream Functions Vary with Scale



2nd Order Kennebec

5th Order Kennebec

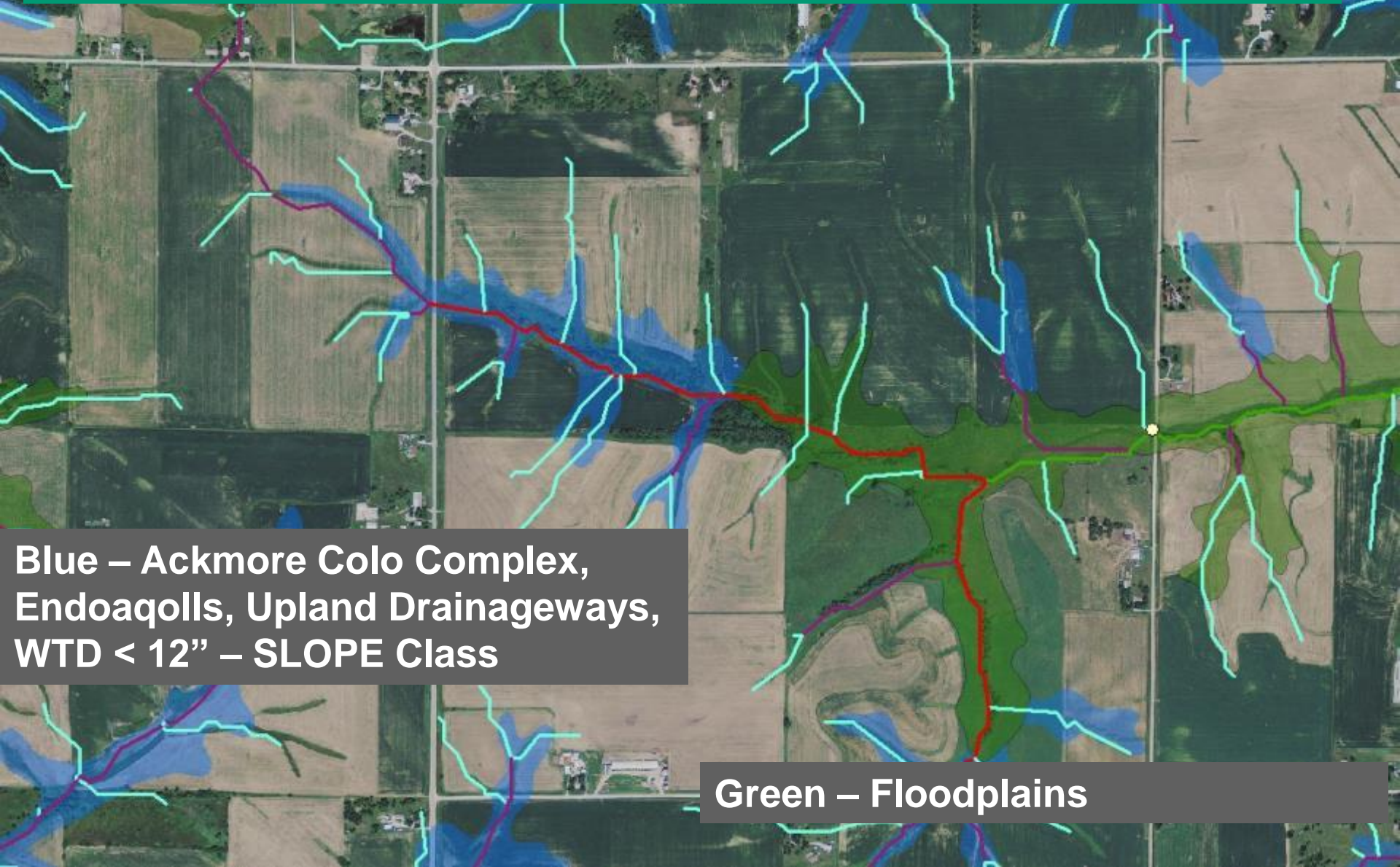
Map Unit Dis-Aggregation

SLOPE – Headwater Reaches

- **Dominant Water Source – Groundwater**
- **No geomorphic Channel**
- **Vegetated**



Landscape Functional Break: SLOPE to RIVERINE HGM Class



**Blue – Ackmore Colo Complex,
Endoaqolls, Upland Drainageways,
WTD < 12” – SLOPE Class**

Green – Floodplains

SLOPE Wetlands – Watershed Reaches Above Floodplains



Kansas Headwater



Idaho Headwater Fen



New York Headwater Fen

Attributes:

- **Taxonomy – “endosaturated” Great Group**
- **Taxonomy – Histosol or Histic**
- **Geomorphic Description – Ex. “upland drainageways”**
- **Water Features – WTD < 12”, most months**

DEPRESSION CLASS

**Nebraska Rainwater Basin –
Recharge DEPRESSION**



**Wyoming – Recharge
DEPRESSION, Gillette**



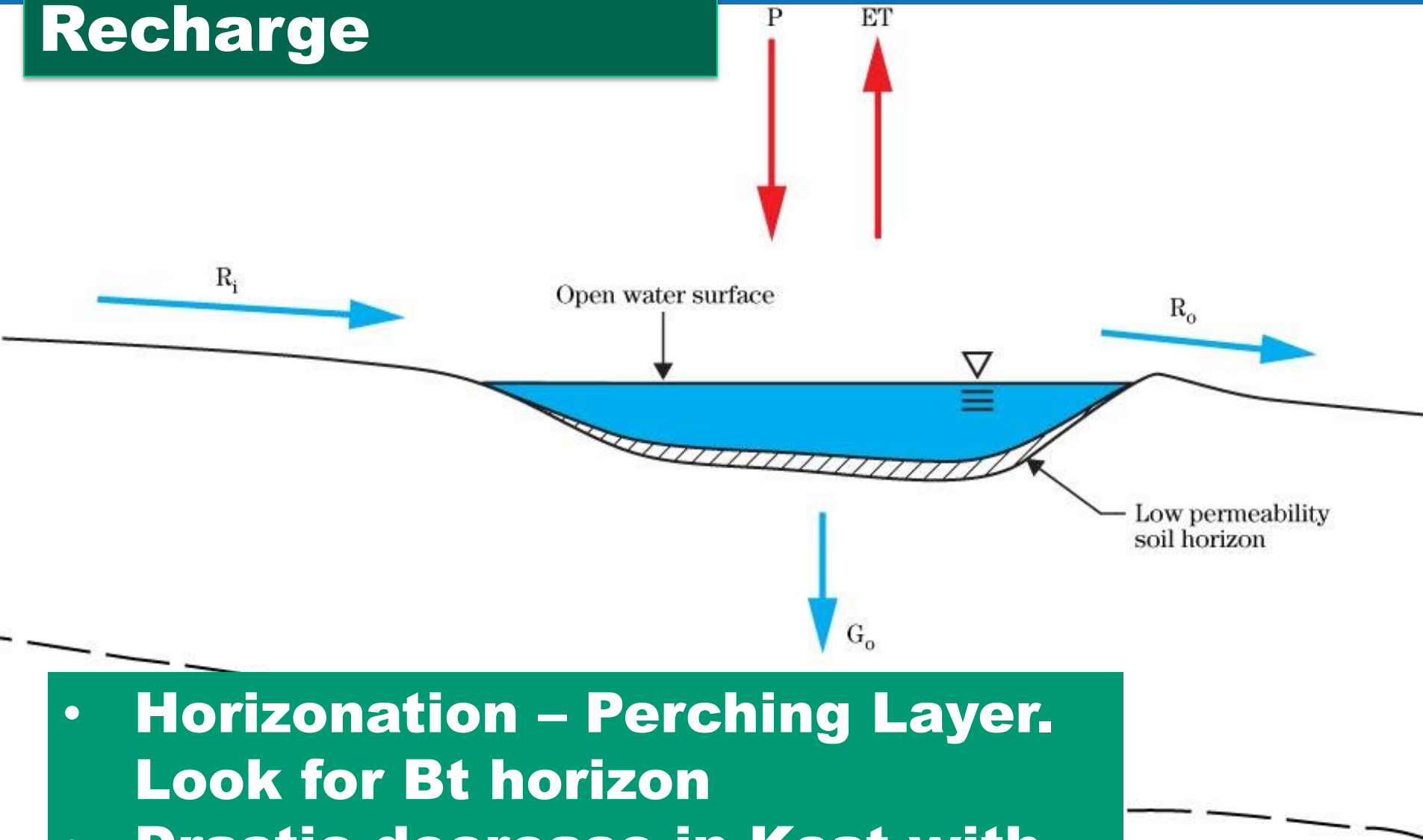
**South Dakota
Prairie Pothole –
Recharge DEPRESSION**



**South Carolina – Carolina Bay
Discharge DEPRESSION**



DEPRESSION - Recharge

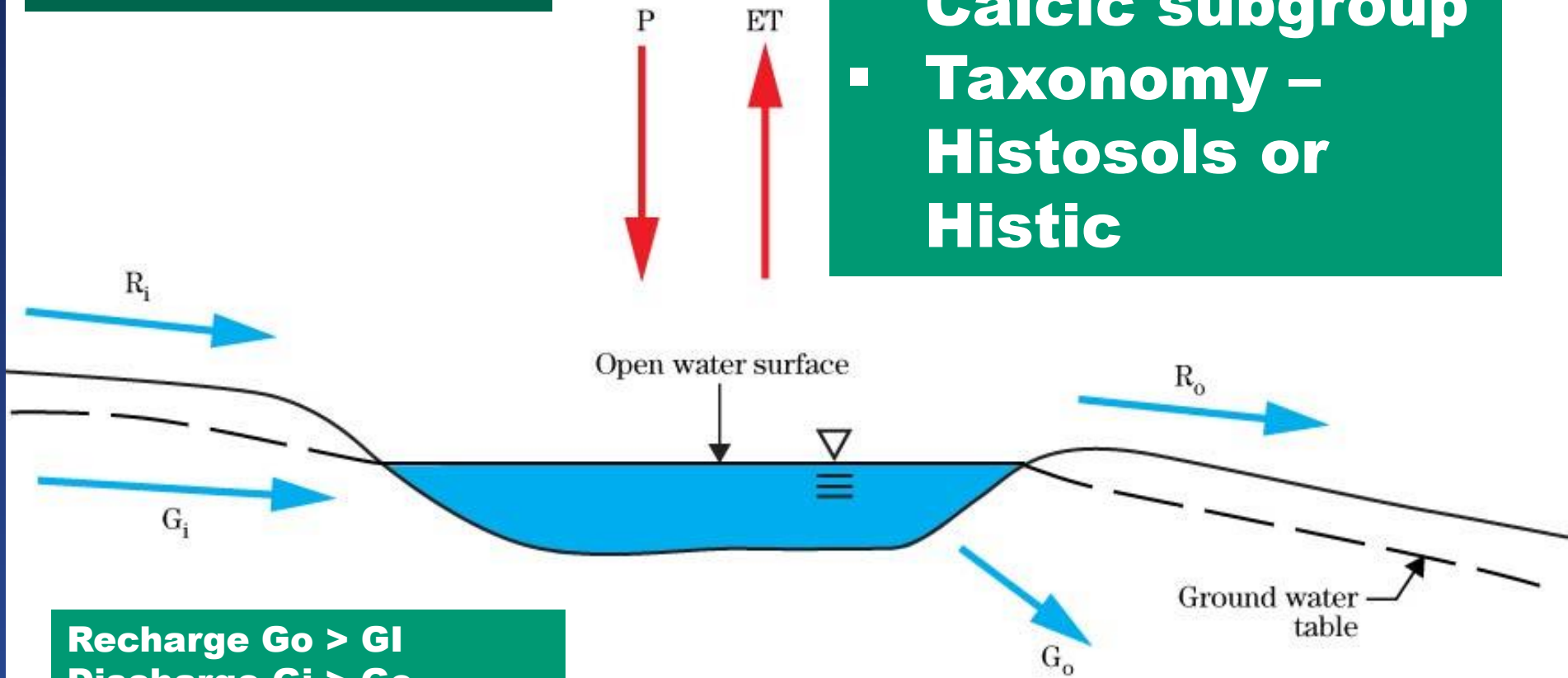


- **Horizonation – Perching Layer.**
Look for Bt horizon
- **Drastic decrease in Ksat with depth**

DEPRESSION - Discharge

High Infiltration
Uplands Support
Strong Discharge
Wetlands

- **No perching layer**
- **Taxonomy Ex. – Calcic subgroup**
- **Taxonomy – Histosols or Histic**



Recharge $G_0 > G_1$
Discharge $G_1 > G_0$
Flow Through $G_1 = G_0$

MINERAL FLAT and DEPRESSION

Brown – MINERAL FLATS

- Interfluves (geomorphic desc.)
- 0-2% Slope Class
- Poorly Drained
- Also – Decrease in Ksat with Depth
- Water Features – no ponding, no flooding, only WTD < 12”

Yellow – DEPRESSION

- Depressions (geomorphic desc.)
- Ponding Frequency and Duration
- No Flooding

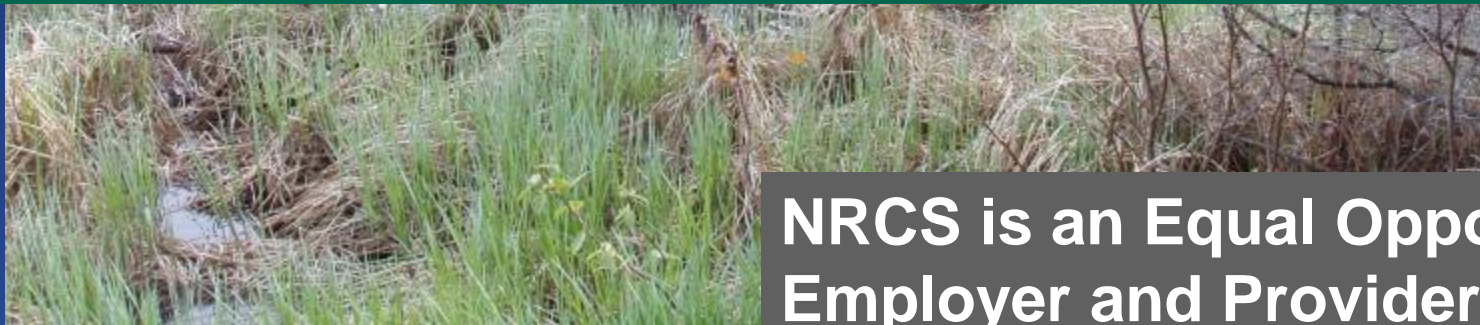
Thanks!

Questions?



Wetland Hydrology Technical Note:
“Technical Note No. 3 - Soil Hydrodynamic Interpretations
for Wetlands”

[http://www.nrcs.usda.gov/wps/portal/
nrcs/main/national/water/wetlands/restore/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/wetlands/restore/)



**NRCS is an Equal Opportunity
Employer and Provider**