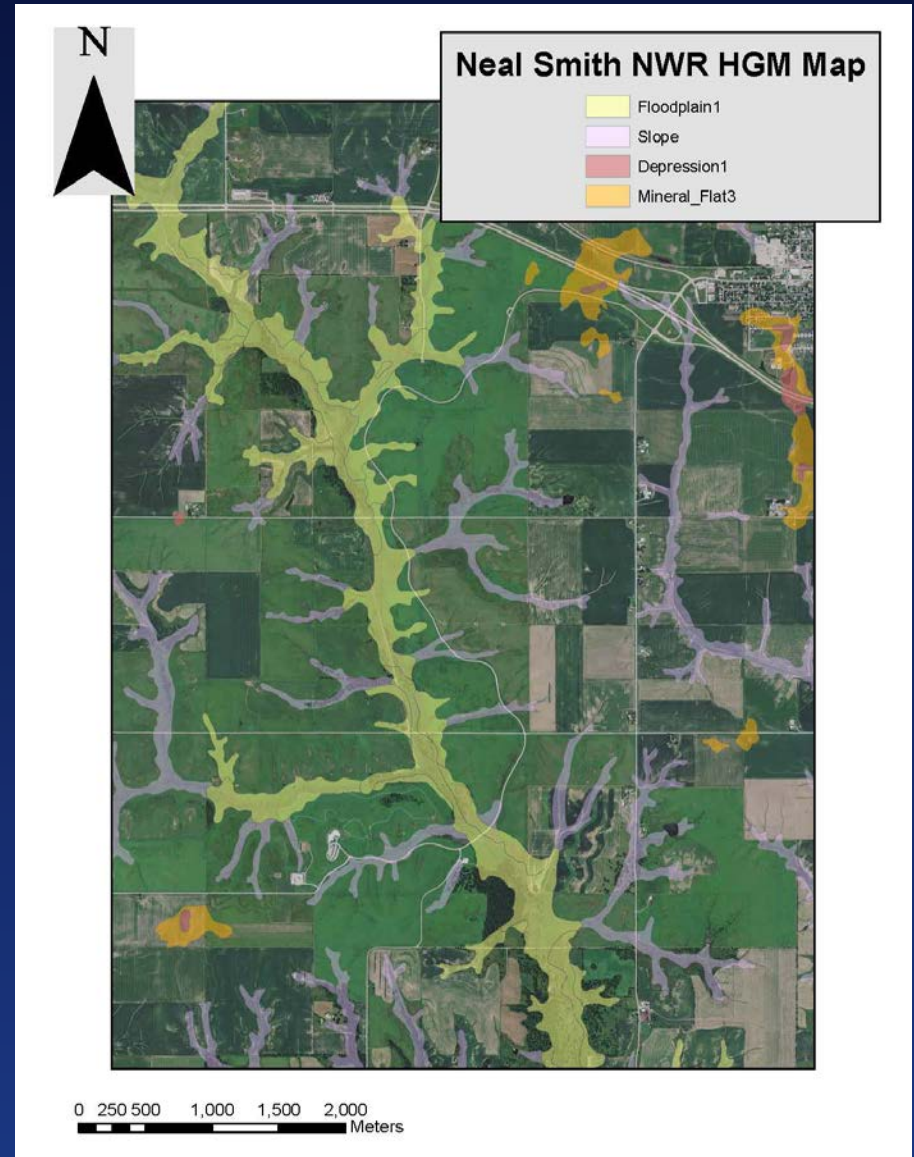


Mapping Wetland Landscapes

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



Hydrogeomorphic (HGM) System

- 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
- Must make a decision between “lumping” and “splitting”

Three Factors that Define Wetland Classes

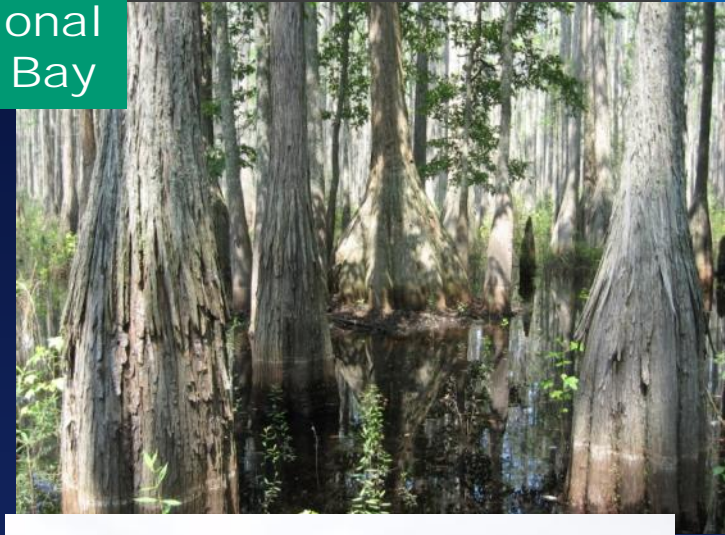
- Landscape Position
- Dominant Water Source
- Hydrodynamics



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



HGM is a *Landscape* Classification System

- Cowardin is a Wetland Classification System
- Cowardin Links Hydrologic Regimes and Plant Communities (With some landscape attributes)
- HGM Classifies Landscapes that Contain Wetlands
- Wetlands on Distinct Landscapes Have Distinct Functions
- Cowardin/NWI Mapping Defines Wetland Boundaries
- HGM Mapping Defines Landscape Boundaries

Soils Data in the Soil Survey Geographic (SSURGO) Dataset

- Attributes Contain Landscape Position, Dominant Water Source, and Hydrodynamic Information
- This Information Matches Very Well With HGM Parameters
- HGM Landscape Boundaries can be Formed by Aggregations or Soil Map Units
- SSURGO Data and the NASIS Database is Poorly Understood Outside of NRCS Soil Science

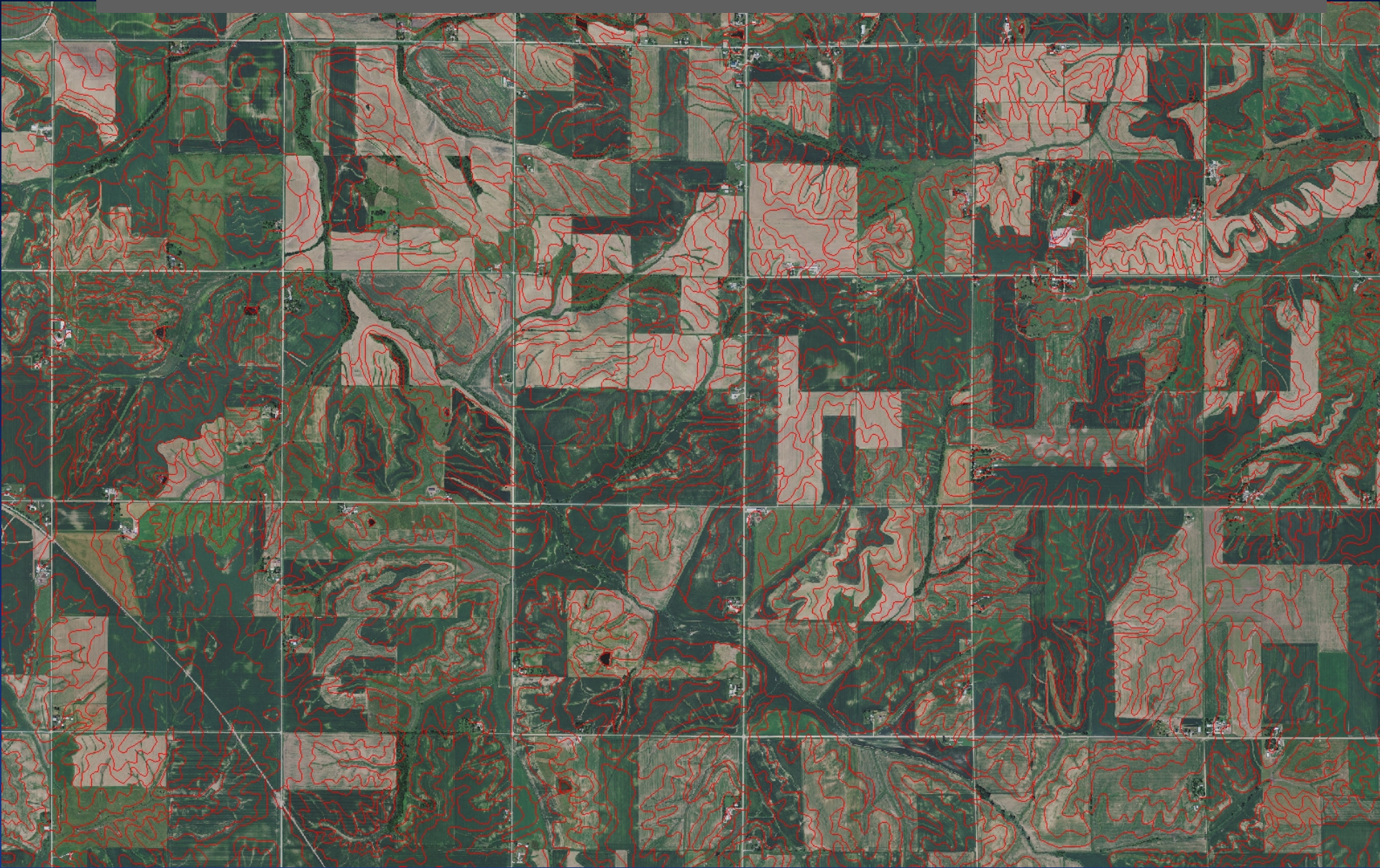
Ecological Site Descriptions (ESD)

- Cooperative Effort with NRCS, USFW, and BLM
- May include USFWS
- Seeks to Spatially Define Landscapes by Ecological Function
- Within NRCS, we have general agreement that HGM landscape principles are consistent with Ecological Site Boundaries
- ESD *site concepts* are being developed using the HGM framework in Iowa, Missouri, and a few other states – using SSURGO database extractions on a GIS platform

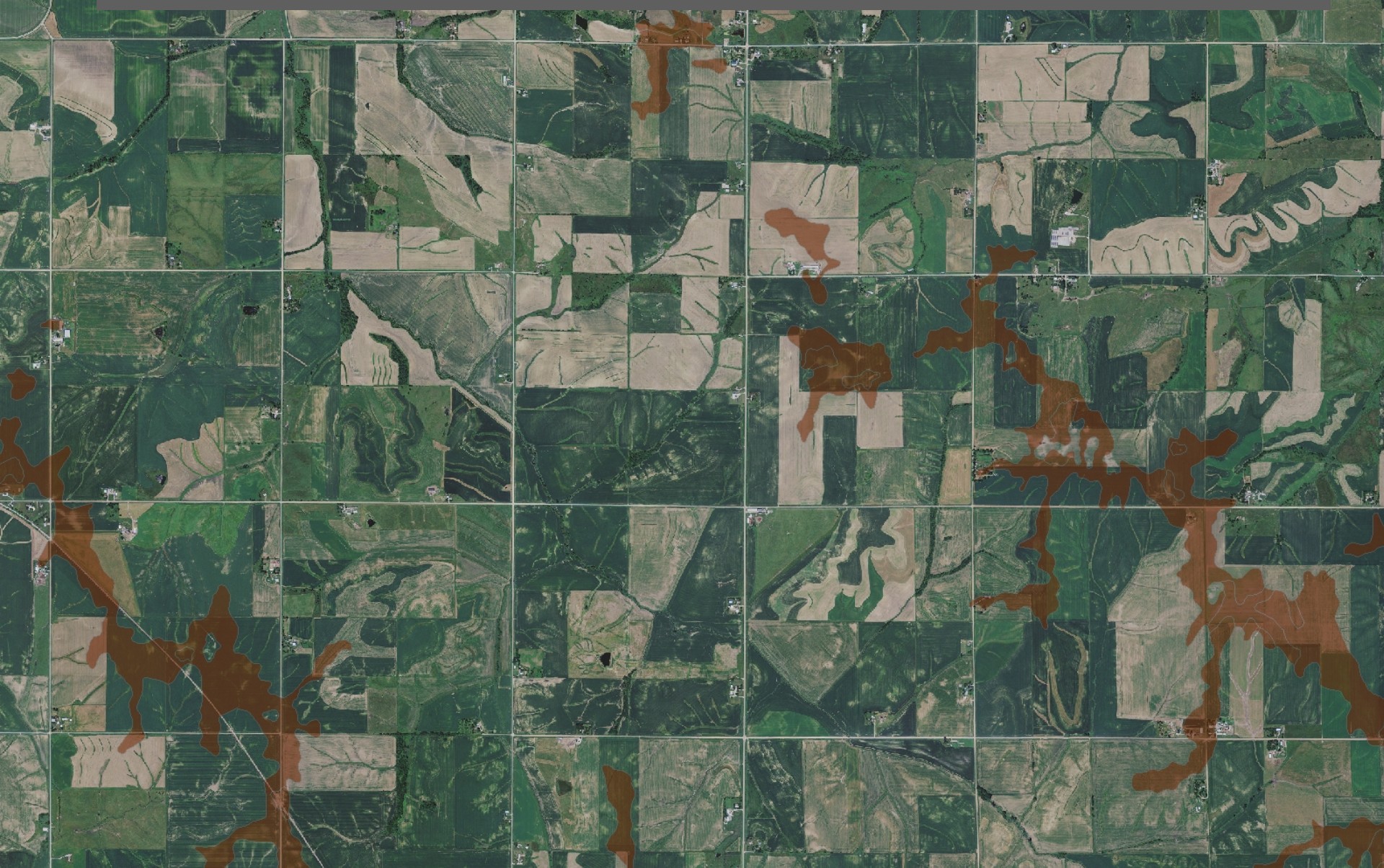
Colfax County, Iowa



Soil Map Units



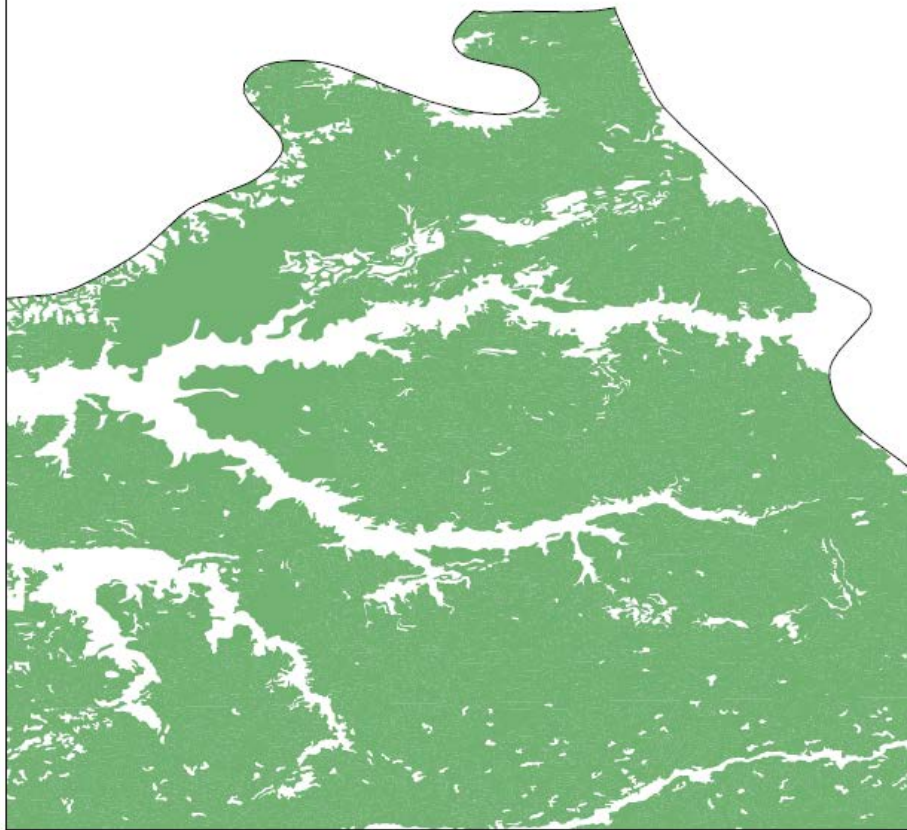
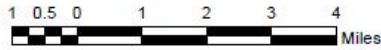
Mineral Flat HGM Class



MINERAL FLAT (Flatwoods), Indianapolis, IN



Landscape Mapping Mineral Flats



Current Efforts –

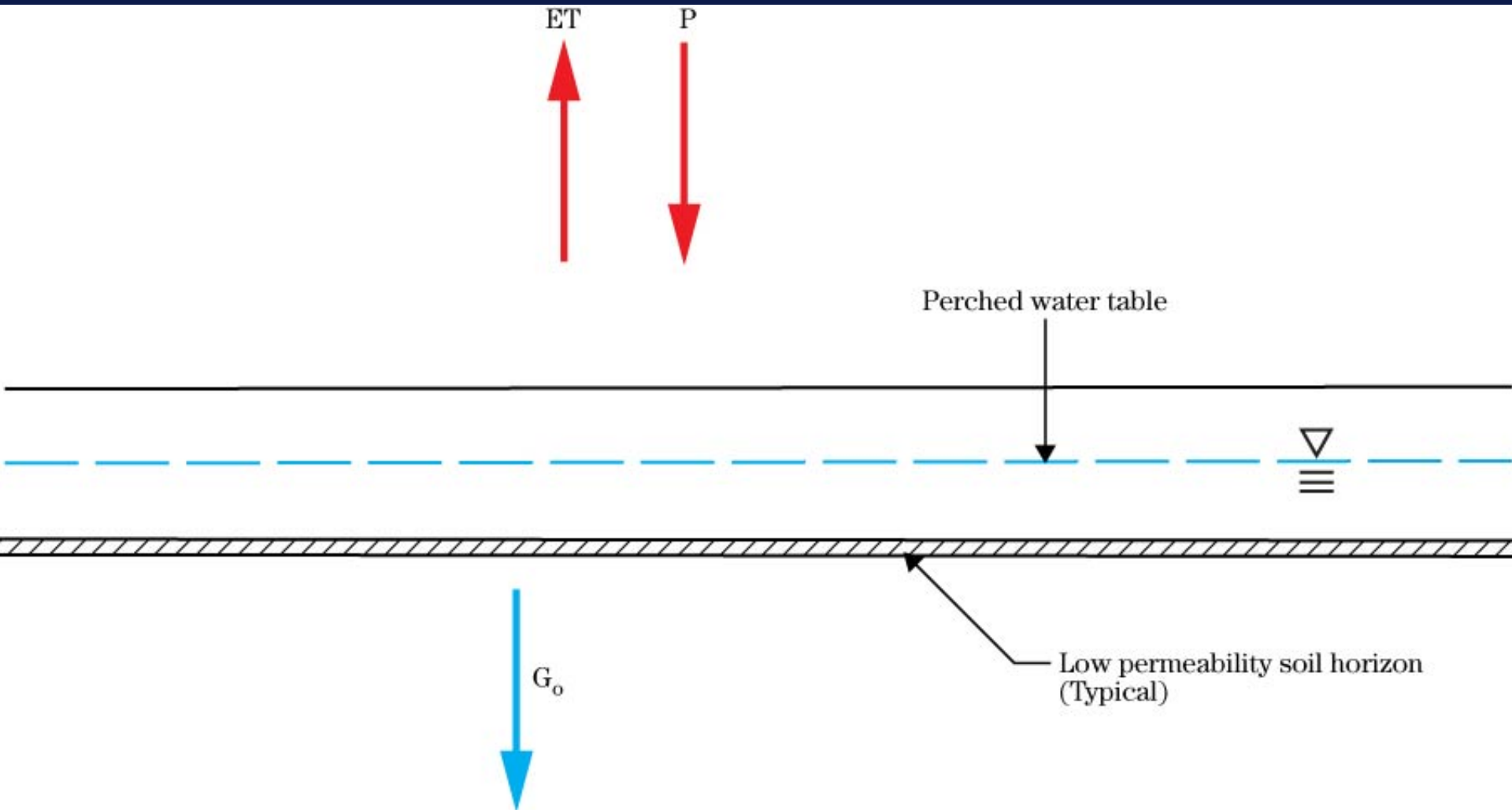
- ESD for site in Ohio and Indiana Till Plains
- HGM Mineral Flat Model
- Site mapping



MINERAL FLAT Wetland



Hydrodynamics and Water Budget



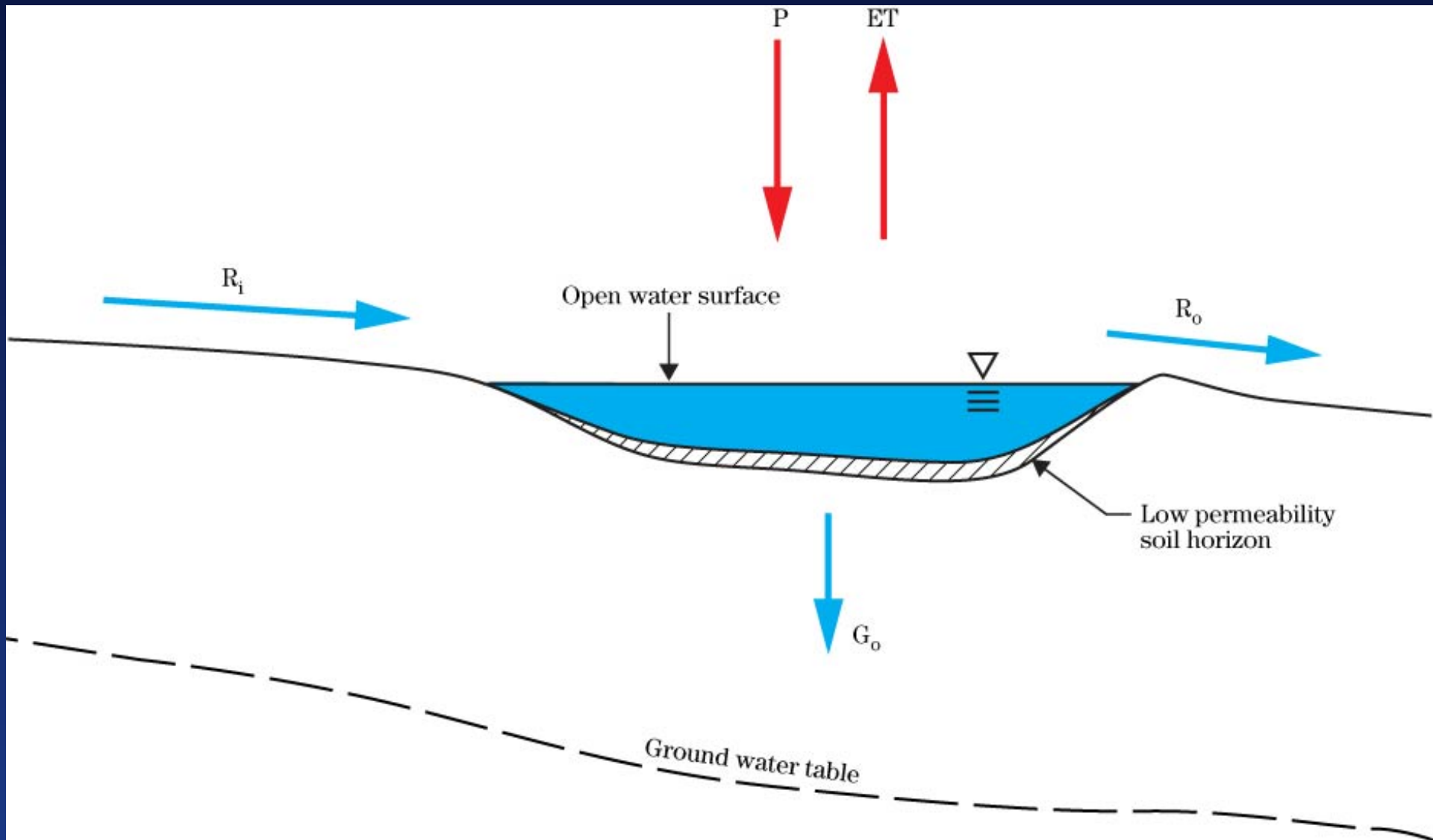
DEPRESSIONAL HGM Class or MINERAL FLAT – Depressional Complex



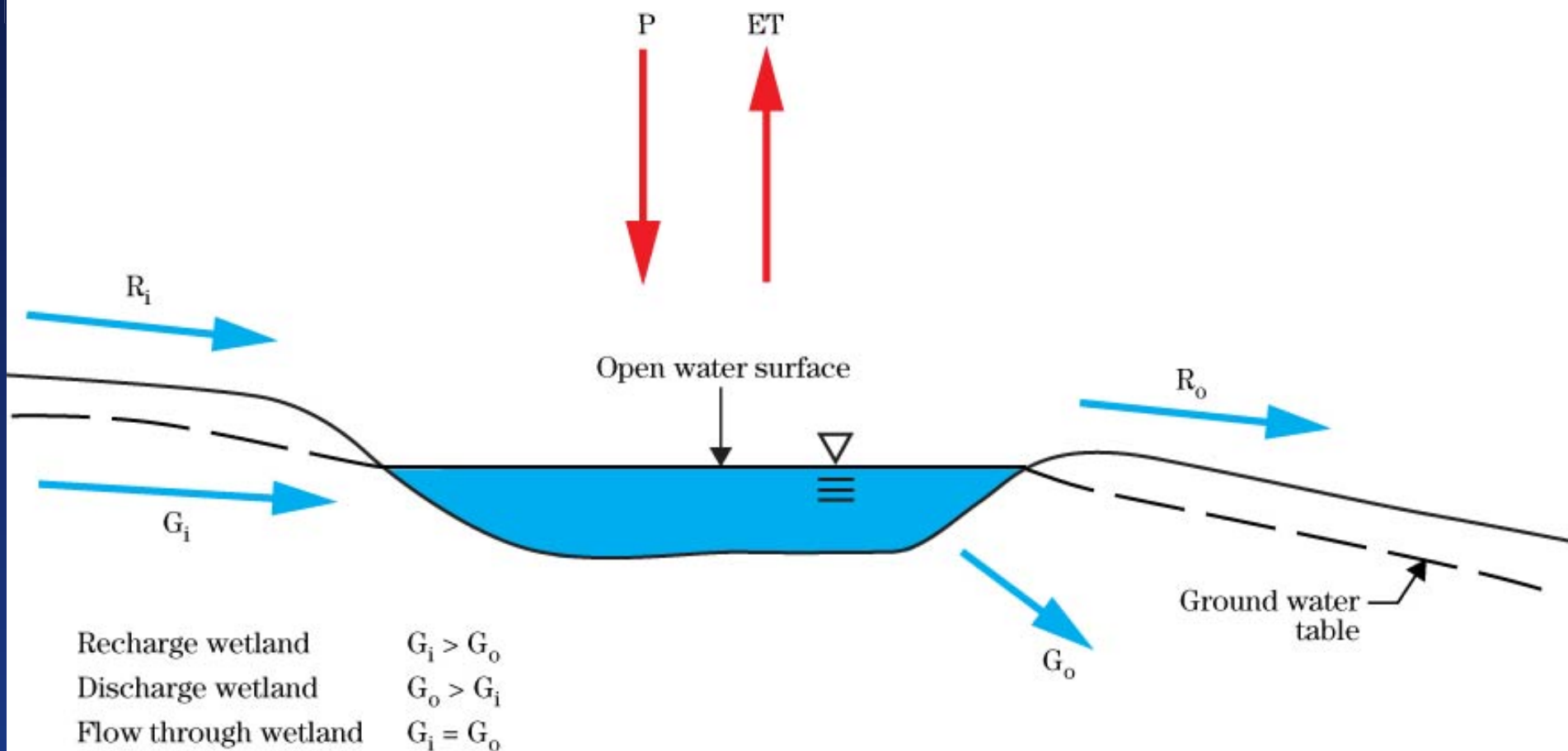
Prairie Pothole Depression – Near Huron, SD



Depressional - Recharge



Depressional – Discharge or Flow Through



SLOPE HGM Class in Headwaters



SLOPE HGM Class – Kansas Headwater Reach

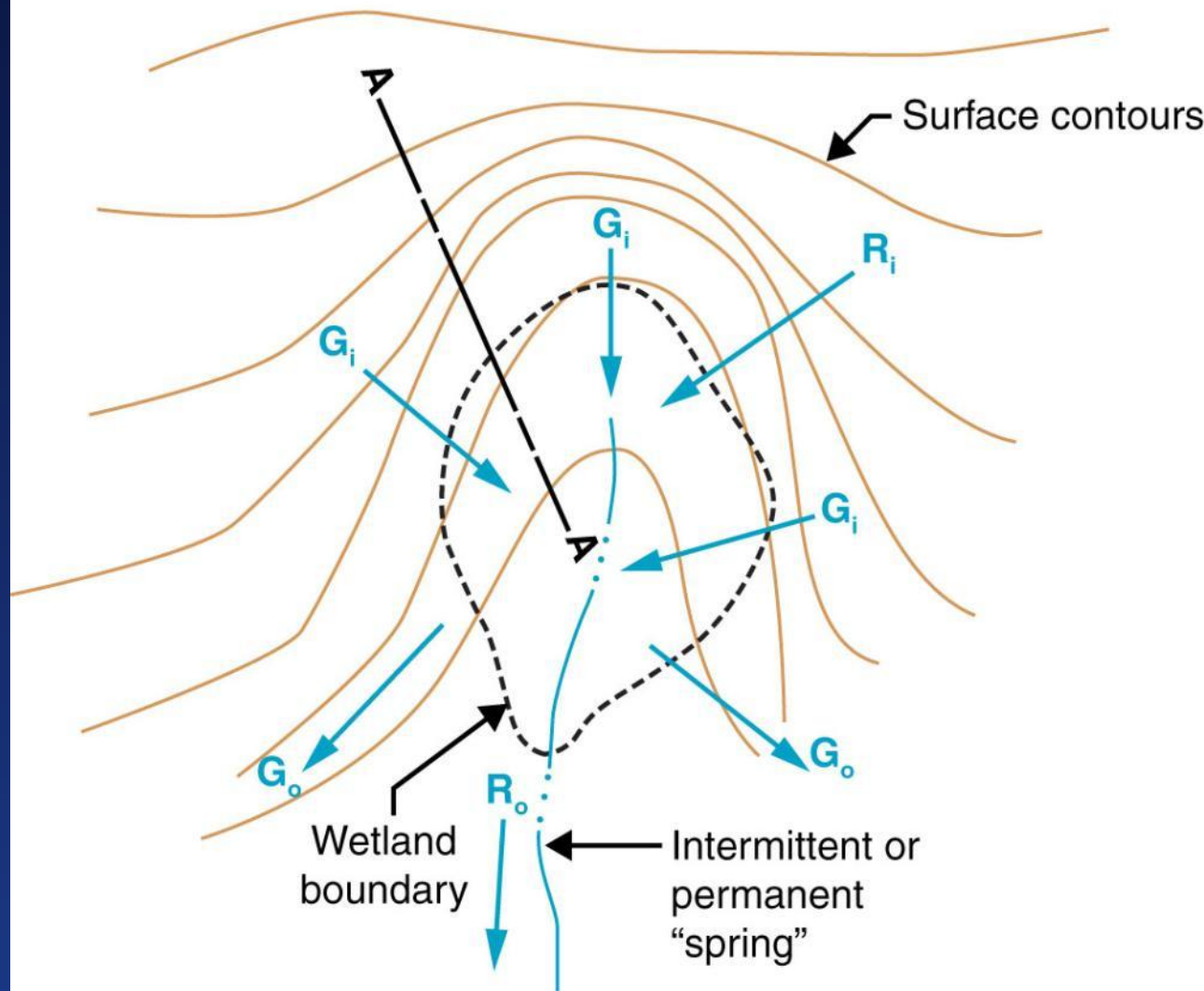


Topographic
SLOPE
Wetland Plan
View

Concave
Landscape
Positions

Typical of
Stream
Headwaters

Topographic Slope Wetland (Plan View)



RIVERINE



RIVERINE, Iowa



United States Department of Agriculture
Natural Resources Conservation Service

RIVERINE Wetlands

Landscape Position

SSURGO
“geomorph”:
Floodplain



RIVERINE – Dominant Water Source – Stream Hydrograph

SSURGO

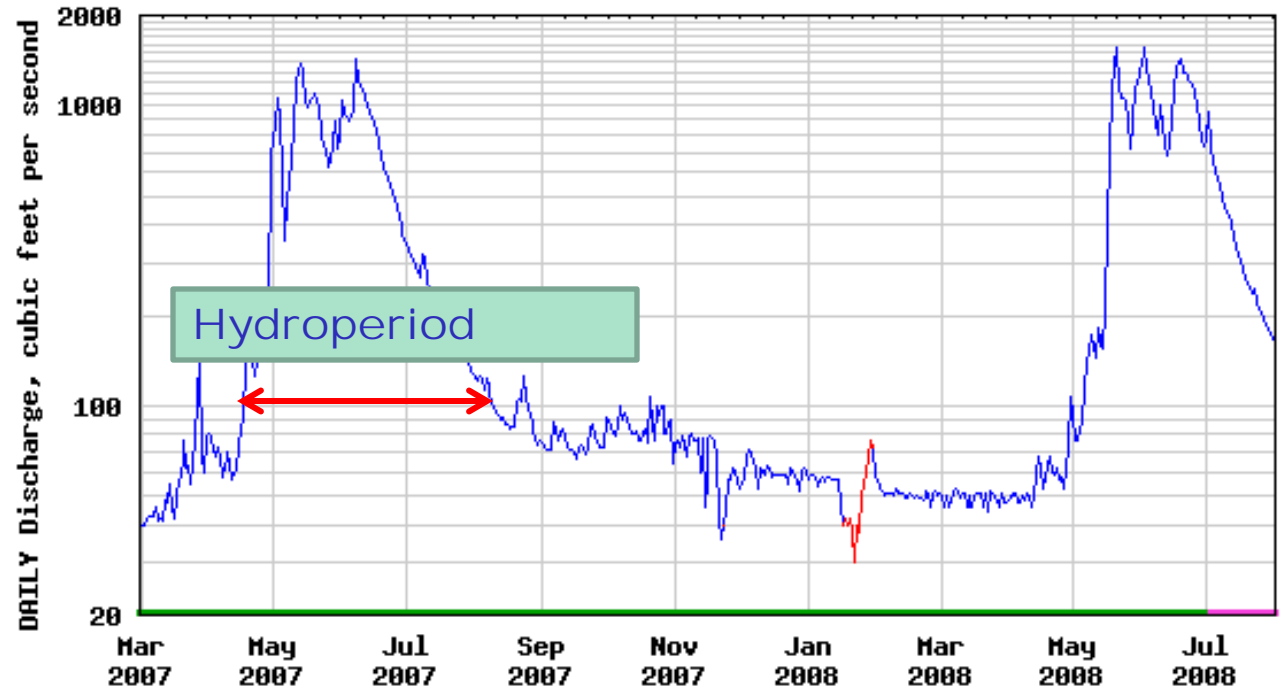
Water

Features

- Flooding
- Ponding
- Groundwater



USGS 06298000 TONGUE RIVER NEAR DAYTON, WY



— Daily mean discharge

— Estimated daily mean discharge

— Period of approved data

— Period of provisional data



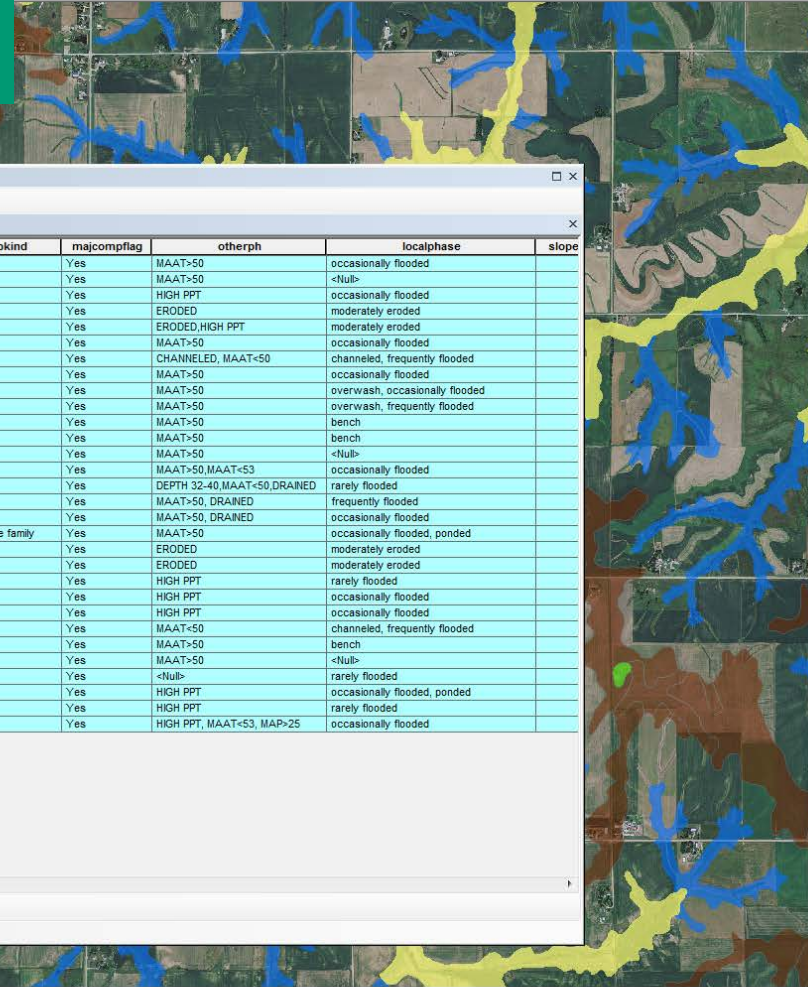
RIVERINE – Surface
Flooding (Lotic)

RIVERINE – Surface Ponding (Lentic)



Attribute Selection From:

- Component
- Muaggat
- MapUnit
- Component Month
- Etc



[aspectocwise]
[aspectrep]
[aspectcwise]
[geomdesc]
[abedodty_1]

Like
> >= And
< <= Or
? () Not

Get Unique Values Go To:

SELECT * FROM component WHERE:
[geomdesc] = 'depressions'

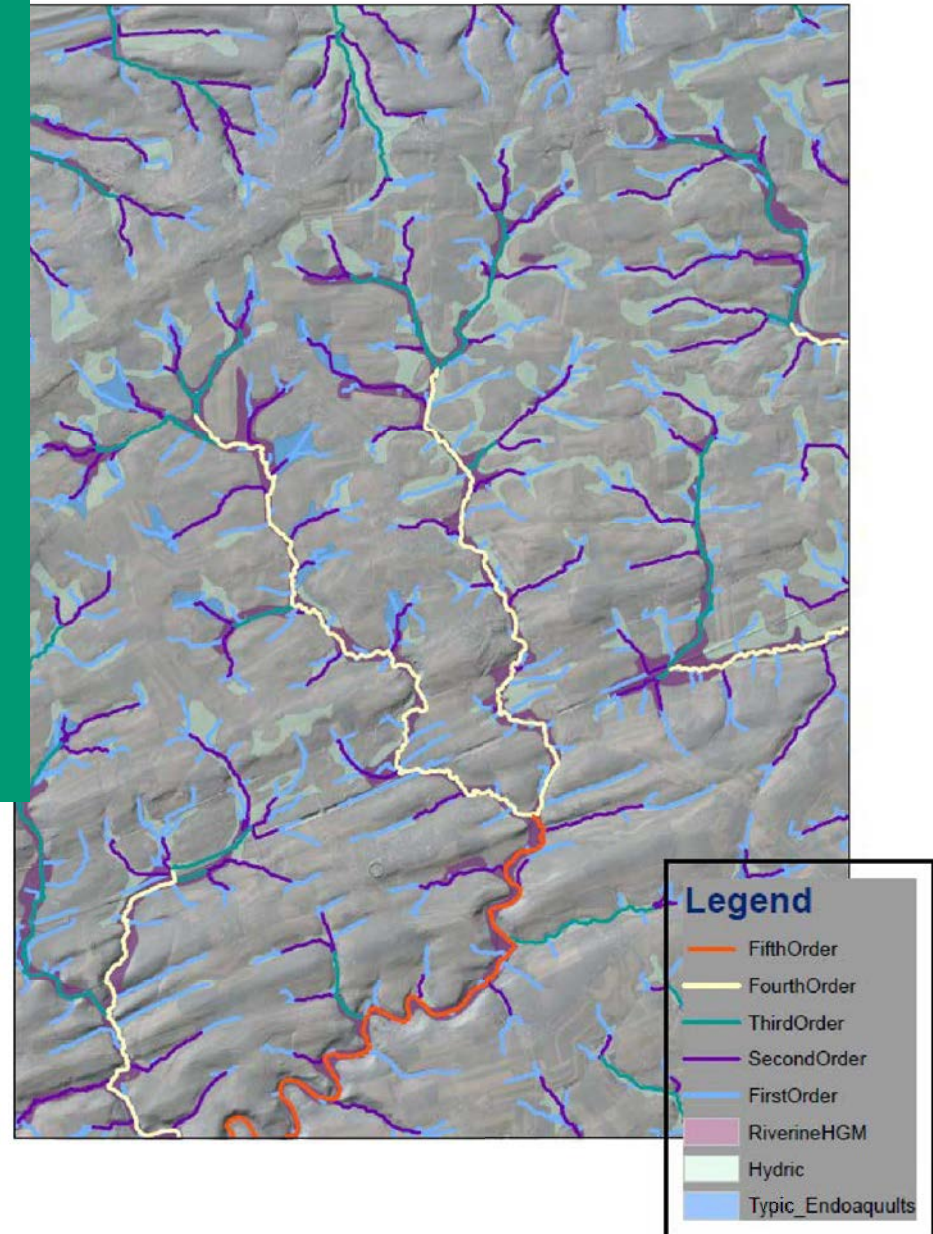
Clear Verify Help Load... Save... Apply Close

component	compctct_l	compctct_r	compctct_h	compname	compkind	majcompflag	otherph	localphase	slope
<Nul>		85	<Nul>	Ackmore	Series	Yes	MAAT>50	occasionally flooded	
<Nul>		95	<Nul>	Bolan	Series	Yes	MAAT>50	<Nul>	
<Nul>		95	<Nul>	Bremer	Series	Yes	HIGH PPT	occasionally flooded	
<Nul>		55	<Nul>	Caleb	Series	Yes	ERODED	moderately eroded	
<Nul>		50	<Nul>	Caleb	Series	Yes	ERODED,HIGH PPT	moderately eroded	
<Nul>		95	<Nul>	Coland	Series	Yes	MAAT>50	occasionally flooded	
<Nul>	30	35	40	Coland	Series	Yes	CHANNELED, MAAT<50	channeled, frequently flooded	
<Nul>		100	<Nul>	Colo	Series	Yes	MAAT>50	occasionally flooded	
<Nul>		100	<Nul>	Colo	Series	Yes	MAAT>50	overwash, occasionally flooded	
<Nul>	30	35	40	Colo	Series	Yes	MAAT>50	overwash, frequently flooded	
<Nul>		100	<Nul>	Downs	Series	Yes	MAAT>50	bench	
<Nul>		100	<Nul>	Downs	Series	Yes	MAAT>50	bench	
<Nul>		90	<Nul>	Flagler	Series	Yes	MAAT>50	<Nul>	
<Nul>		95	<Nul>	Kennebec	Series	Yes	MAAT>50,MAAT<53	occasionally flooded	
	50	75	100	Lawler	Series	Yes	DEPTH 32-40,MAAT<50,DRAINED	rarely flooded	
	25	30	35	Lawson	Series	Yes	MAAT>50, DRAINED	frequently flooded	
	30	35	40	Lawson	Series	Yes	MAAT>50, DRAINED	occasionally flooded	
<Nul>		90	<Nul>	Marsh	Taxon above family	Yes	MAAT>50	occasionally flooded, ponded	
<Nul>		45	<Nul>	Mystic	Series	Yes	ERODED	moderately eroded	
<Nul>		50	<Nul>	Mystic	Series	Yes	ERODED	moderately eroded	
<Nul>		90	<Nul>	Nevin	Series	Yes	HIGH PPT	rarely flooded	
<Nul>		85	<Nul>	Nodaway	Series	Yes	HIGH PPT	occasionally flooded	
	20	30	35	Nodaway	Series	Yes	HIGH PPT	occasionally flooded	
<Nul>	55	60	65	Spillville	Series	Yes	MAAT>50	channeled, frequently flooded	
<Nul>		100	<Nul>	Tama	Series	Yes	MAAT>50	bench	
<Nul>		100	<Nul>	Tama	Series	Yes	MAAT>50	<Nul>	
<Nul>		95	<Nul>	Tuskeego	Series	Yes	MAAT>50	rarely flooded	
<Nul>		95	<Nul>	Wabash	Series	Yes	HIGH PPT	occasionally flooded, ponded	
<Nul>		95	<Nul>	Wiota	Series	Yes	HIGH PPT	rarely flooded	
<Nul>		90	<Nul>	Zook	Series	Yes	HIGH PPT, MAAT<53, MAP>25	occasionally flooded	

Lancaster County, PA

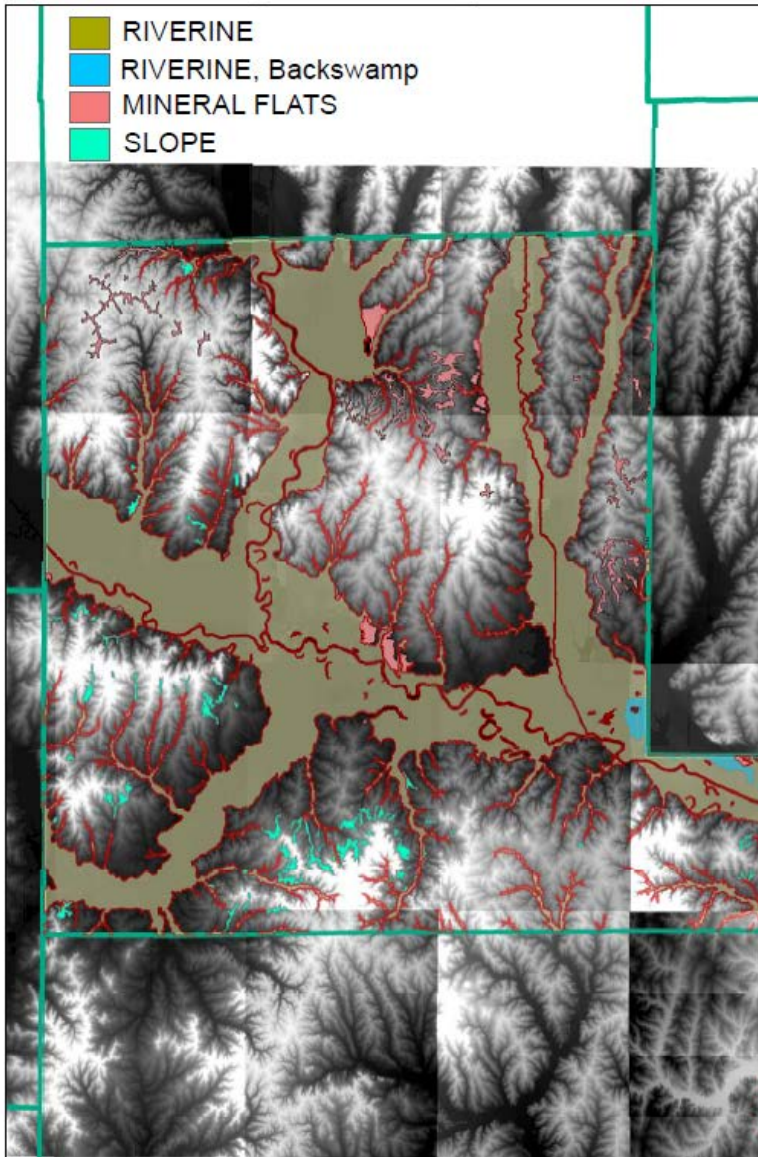
- Typic Endoaquults
- Groundwater Discharge
- SLOPE HGM Class
- First and Second Order
- 5 Acre Flow Acc.
- Bog Turtle Habitat
- SSURGO with DEM Data
- Strahler Stream Order Derivative

Lancaster County
1 Class Map





Wetland HGM Types Livingston County, Missouri



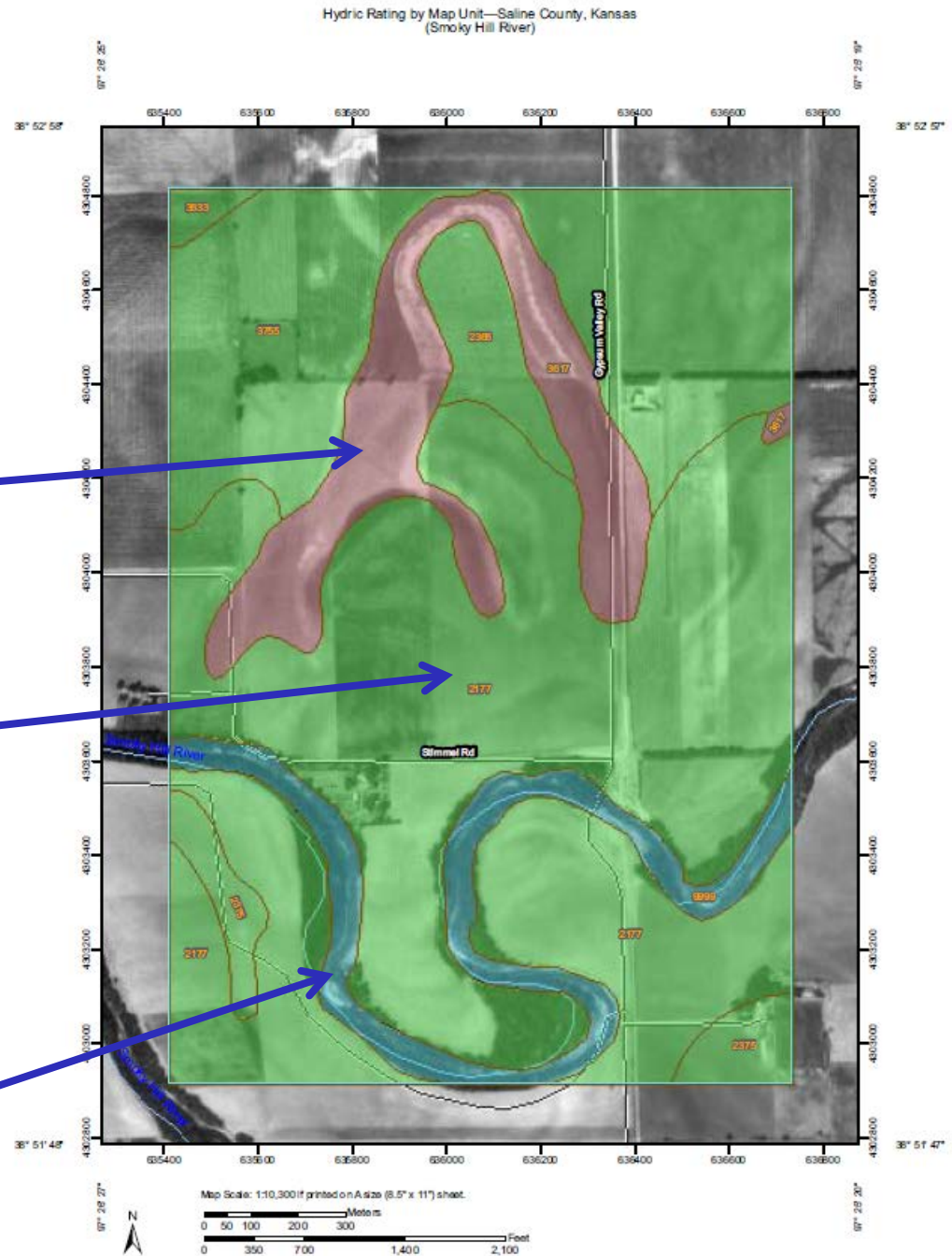
compname	hydricrating	Floodplain Soils geomdesc	taxsubgrp
Tice	No	flood-plain steps on river valleys	Fluvaquentic Hapludolls
Nodaway	No	flood-plain steps, river valleys	Mollic Udifluvents
Zook	Yes	flood-plain steps, river valleys	Cumulic Vertic Endoaquolls
Portage	Yes	flood plains, river valleys	Vertic Endoaquolls
Wabash	Yes	flood-plain steps, river valleys	Cumulic Vertic Endoaquolls
Sandover	No	flood plains on river valleys	Aquic Udifluvents
Carlow	Yes	flood plains on river valleys	Vertic Endoaquolls
Tice	No	flood plains on river valleys	Fluvaquentic Hapludolls
Wabash	Yes	flood plains, river valleys	Cumulic Vertic Endoaquolls
Zook	Yes	flood plains on river valleys	Cumulic Vertic Endoaquolls
Vesser	Yes	flood-plain steps on river valleys	Argiaquic Argialbolls
Colo	Yes	flood-plain steps, river valleys	Cumulic Endoaquolls

Episaturated Floodplain – Hydric Soil Map

Hydric
(Floodplain Oxbow)

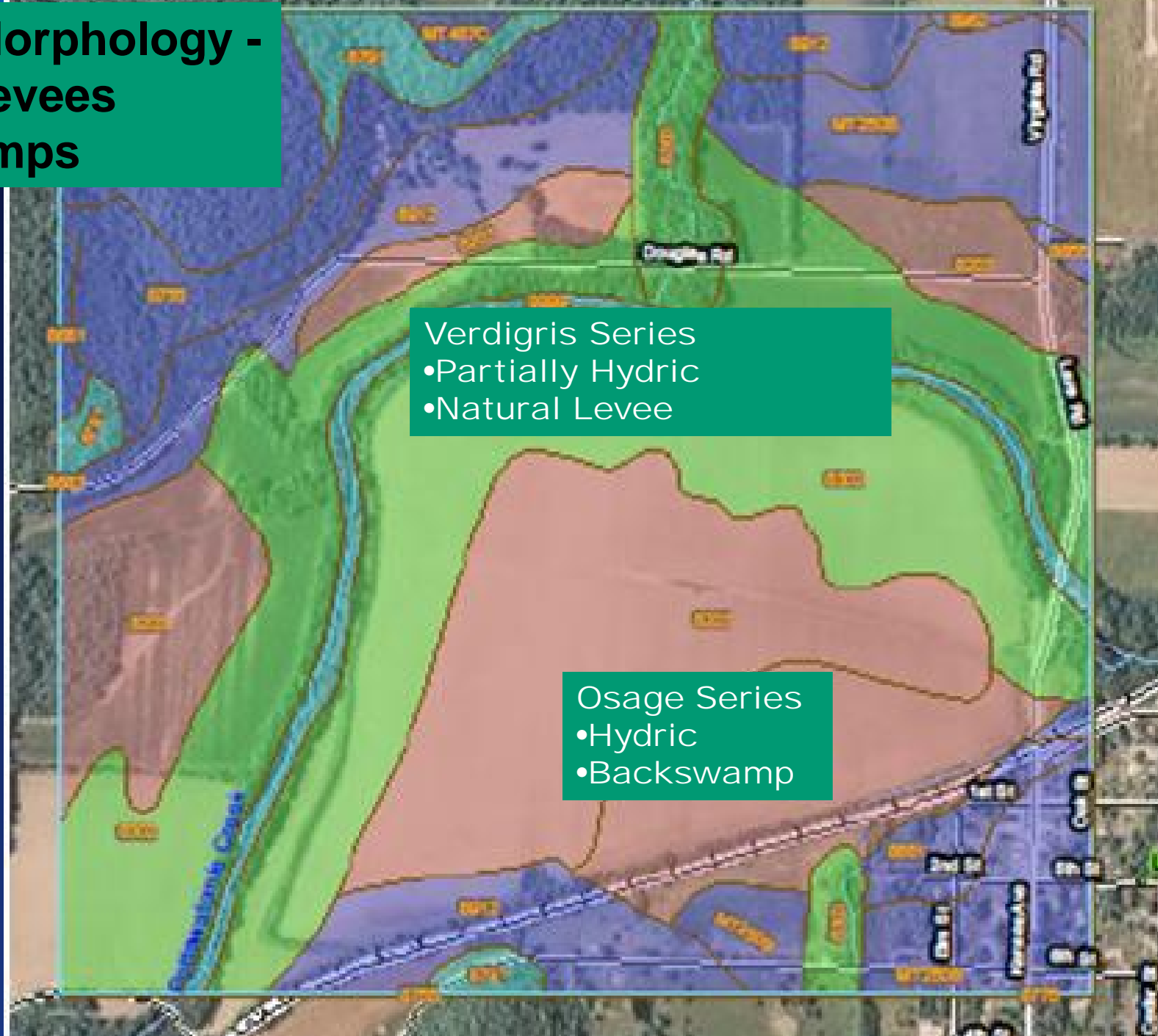
Partially Hydric
(Floodplain Flat)

Active
Channel



Riverine Morphology -

- Natural Levees
- Backswamps



SLOPE



Dominant Water
Source - Groundwater

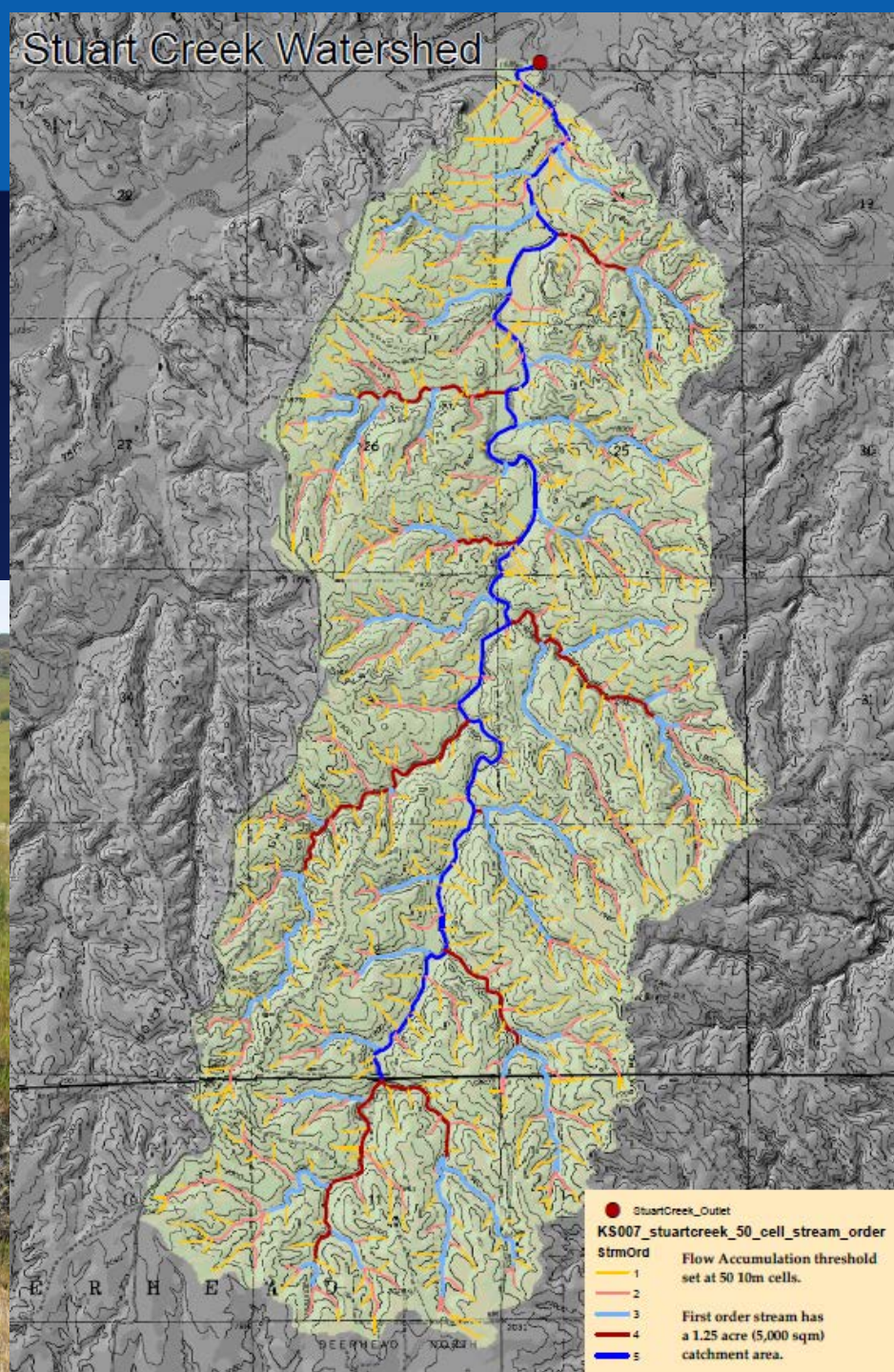
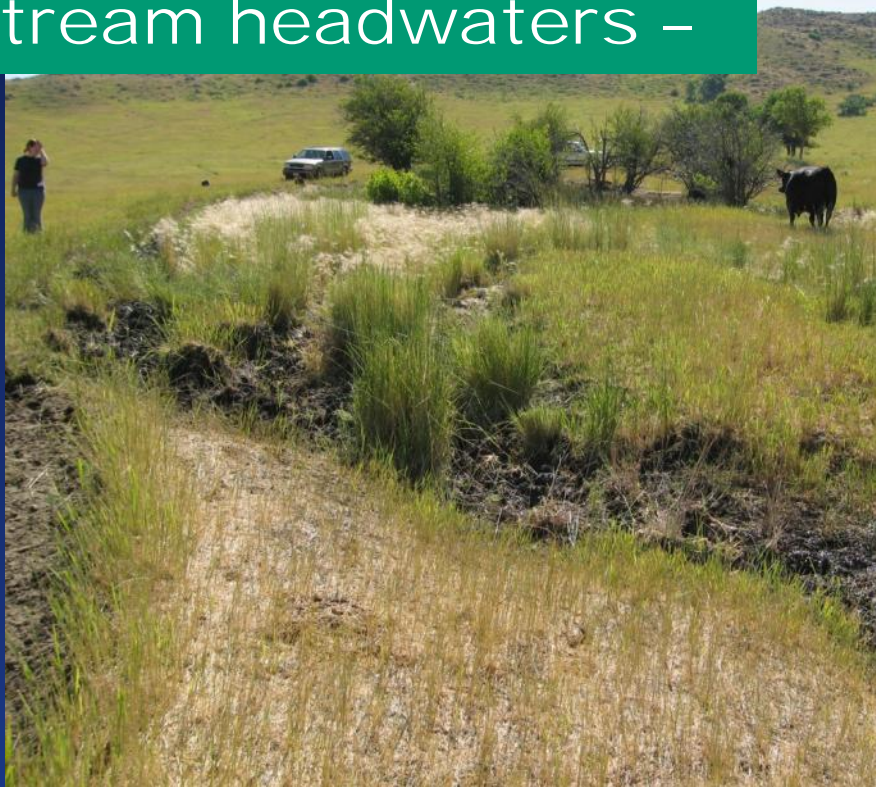


SLOPE

Department of Agriculture
Conservation Service

Landscape Position –

Concave Topographic
positions, usually
stream headwaters –



**Slope HGM Class
Wetland**

**Wyoming Sage Grouse
Country**



ORGANIC SOIL FLAT

Dominant Water Source – Direct Precipitation

- Ombotrophic Bogs
- Extensive Fens



ESTUARINE FRINGE

Dominant Water Source - Tides





Estuarine Fringe

- Organic Soils are Common
- Tidally Influenced Salt, Brackish, or Freshwater
- Adjoins Riverine HGM landscapes

ESTUARINE FRINGE – Tidal Inlet Channels



LACUSTRINE FRINGE

Dominant Water Source- Lake Fluctuations

Jenny Lake - Tetons



Yellowstone Lake



DEPRESSIONAL

Nebraska Rainwater Basin –
Recharge Depression



Wyoming – Recharge
Depression, Gillette



South Dakota
Prairie Pothole

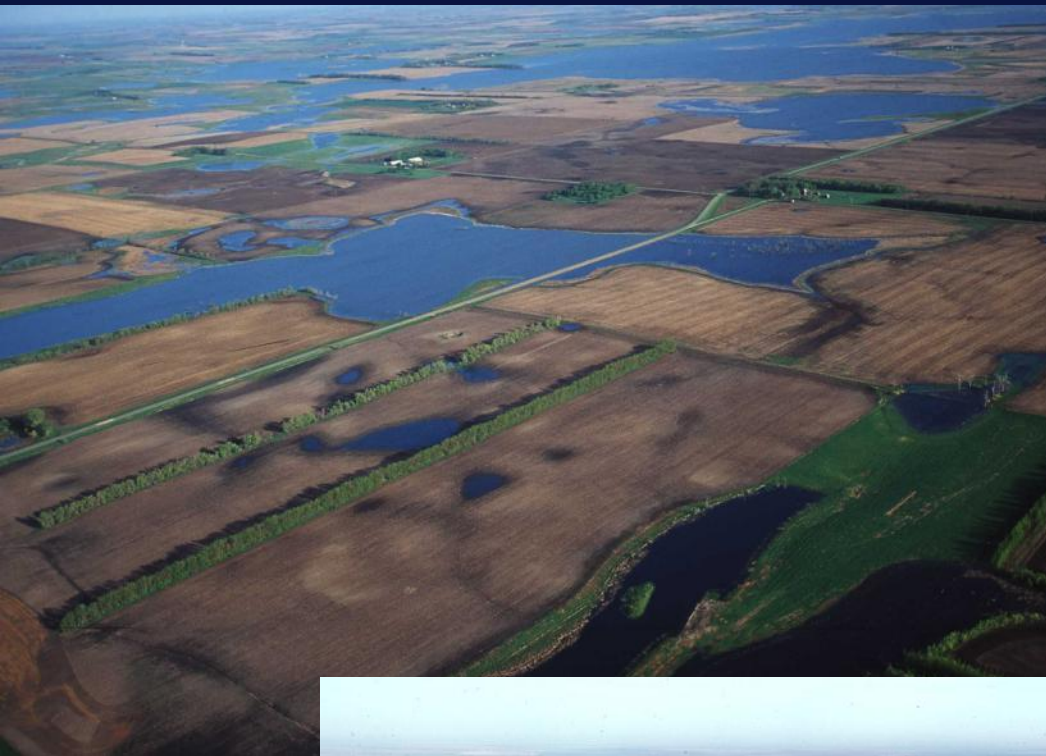


South Carolina – Carolina Bay



DEPRESSIONAL

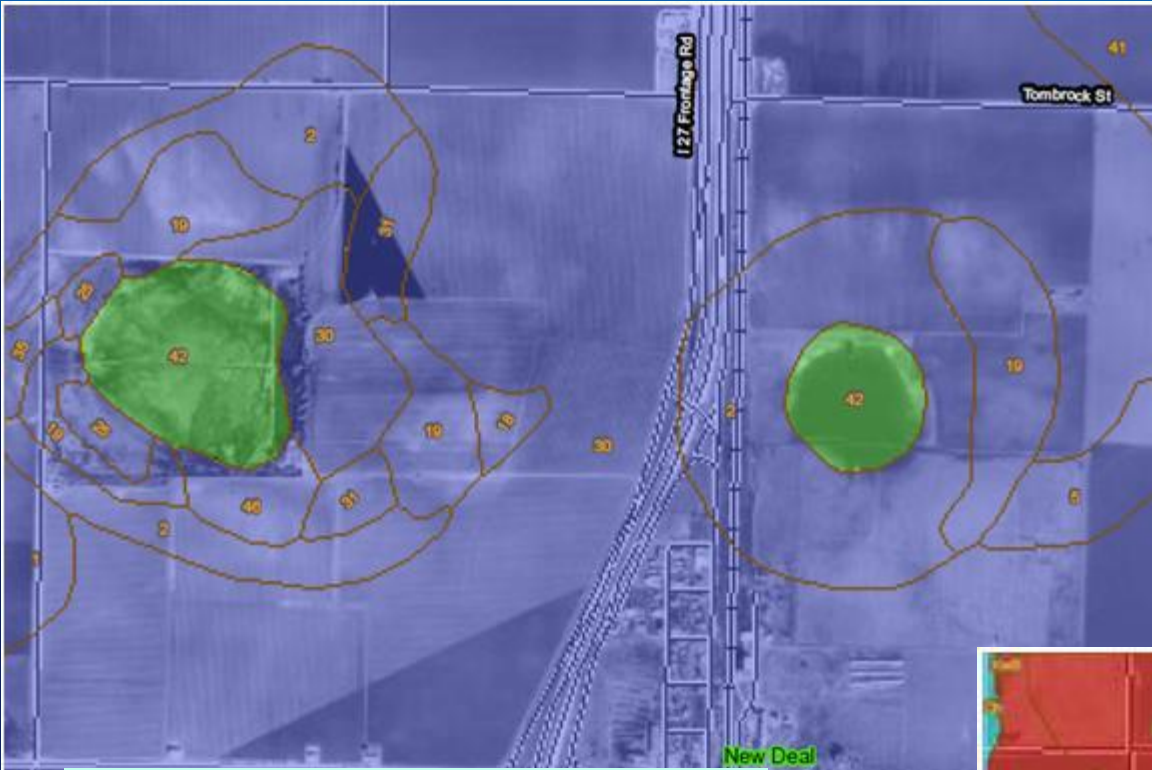
Dominant Water Source – Surface Runoff and/or Groundwater



Depression Wetlands – Unique Functions



- Aquifer Recharge
- Critical Upland Water Sources
- Seasonal Aquatic Organism Habitat



Texas Playas –
Recharge

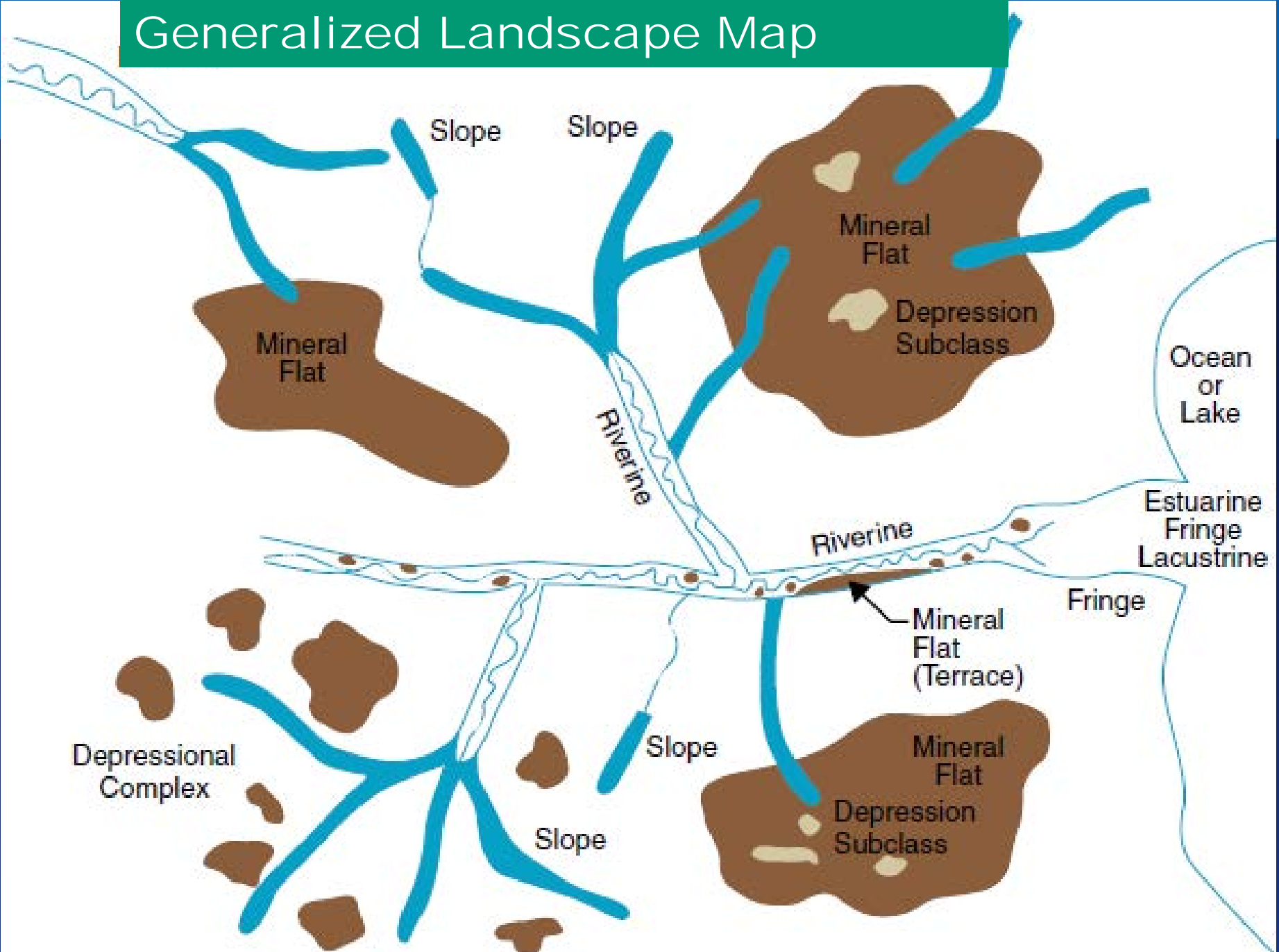
Randall Clay

**Depressional-
Default if not found
on other HGM class**

South Dakota Prairie
Potholes –
Recharge, Discharge,
and Flowthrough



Generalized Landscape Map



HGM Parameters



The Hydrogeomorphic (HGM) Classification System is based on 3 factors –

- Landscape Position
 - WHERE it is
- Dominant Water Source
 - Not the ONLY Source
- Hydrodynamics
 - The direction(s) of water movement in and out

Mapping of HGM Landscapes Is Useful for:

- **Ecological Site Descriptions**
- **HGM Models**
- **Wildlife Habitat Restoration (Initiatives)**
- **Conservation Planning**
- **NEPA Evaluations**
- **Program Allocation and Prioritization**

**Soil information has,
Hydrology, and Landscape Position data that with
GIS tools
can *Analyze*
Ecological Function**

Thank You!

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