

Wetland Ecology for Planners:

Examples of Variation Across the U.S.

Review: Diversity of Wetlands



Diversity of Wetlands

Seasonal/Temporary Wetland, Southern Minnesota



Photo © Minnesota Dept. Natural Resources

Diversity of Wetlands

Deep Marsh, Western Minnesota



Photo © Minnesota Dept. Natural Resources

Diversity of Wetlands

Playa Wetlands, Central Nebraska



Photo: Ted Lagrange, Nebraska Game and Parks Commission

Diversity of Wetlands



Delmarva Bay, Delaware

Photo: Delaware Wetland Monitoring and Assessment Program

Diversity of Wetlands

Montane Fen, Beaverhead-Deerlodge National Forest, Montana



M. Manning photo

Diversity of Wetlands

Wet Prairie, Western Minnesota



Photo © Minnesota Dept. Natural Resources

Diversity of Wetlands



Forested Swamp, Northern Minnesota

Photo © Minnesota Dept. Natural Resources

Diversity of Wetlands



Floodplain Forest, Southern Minnesota

Diversity of Wetlands



Diversity of Wetlands

Pocosin Lakes NWR, North Carolina



Eric H. Christenson photo

Diversity of Wetlands

Sidehill Seep, Minnesota



Photo © Minnesota Dept. Natural Resources

Wetland Functions/Benefits

- Flood attenuation
- Water quality maintenance/improvement
- Fish and wildlife habitat
- Commercial products
- Recreational opportunities
- Climate change remediation

Functions vs. Benefits (Services, Values)

- **Functions** = Things that wetlands do: physical, chemical, biological processes.
Example: Sediment trapping
- **Benefits** = Ways in which wetland functions are useful to people.
Example: Downstream water quality improvement

Wetland Functions and Benefits



Inland Deep Marsh (Depressional)

Physical: Sediment Retention



Benefit: Downstream Water Quality

Sediment Reduction in Constructed Wetlands

Des Plaines River Experimental Wetlands

Experimental Wetland	Inflow g/m ² /wk	Outflow g/m ² /wk	Percent Reduction
3	17.4	2.1	88
4	4.1	0.3	93
5	16.6	1.7	90
6	4.2	0.1	97

From Mitsch, W.J. in U.S. EPA, R.K. Olson, ed., 1993

Physical: Water Storage



Benefit: Flood Attenuation

Sidehill Seep, Minnesota



Photo © Minnesota Dept. Natural Resources

Physical: Water Infiltration

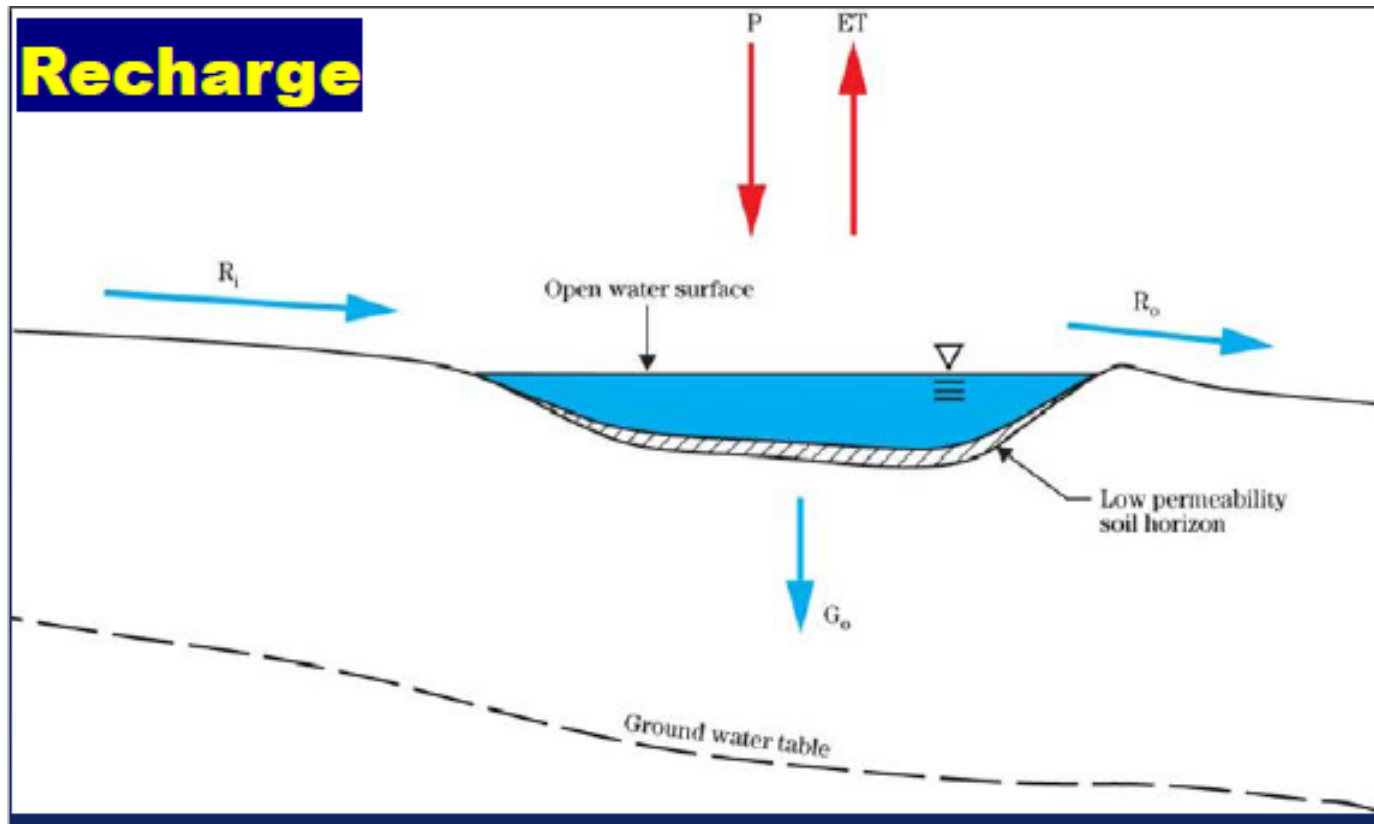
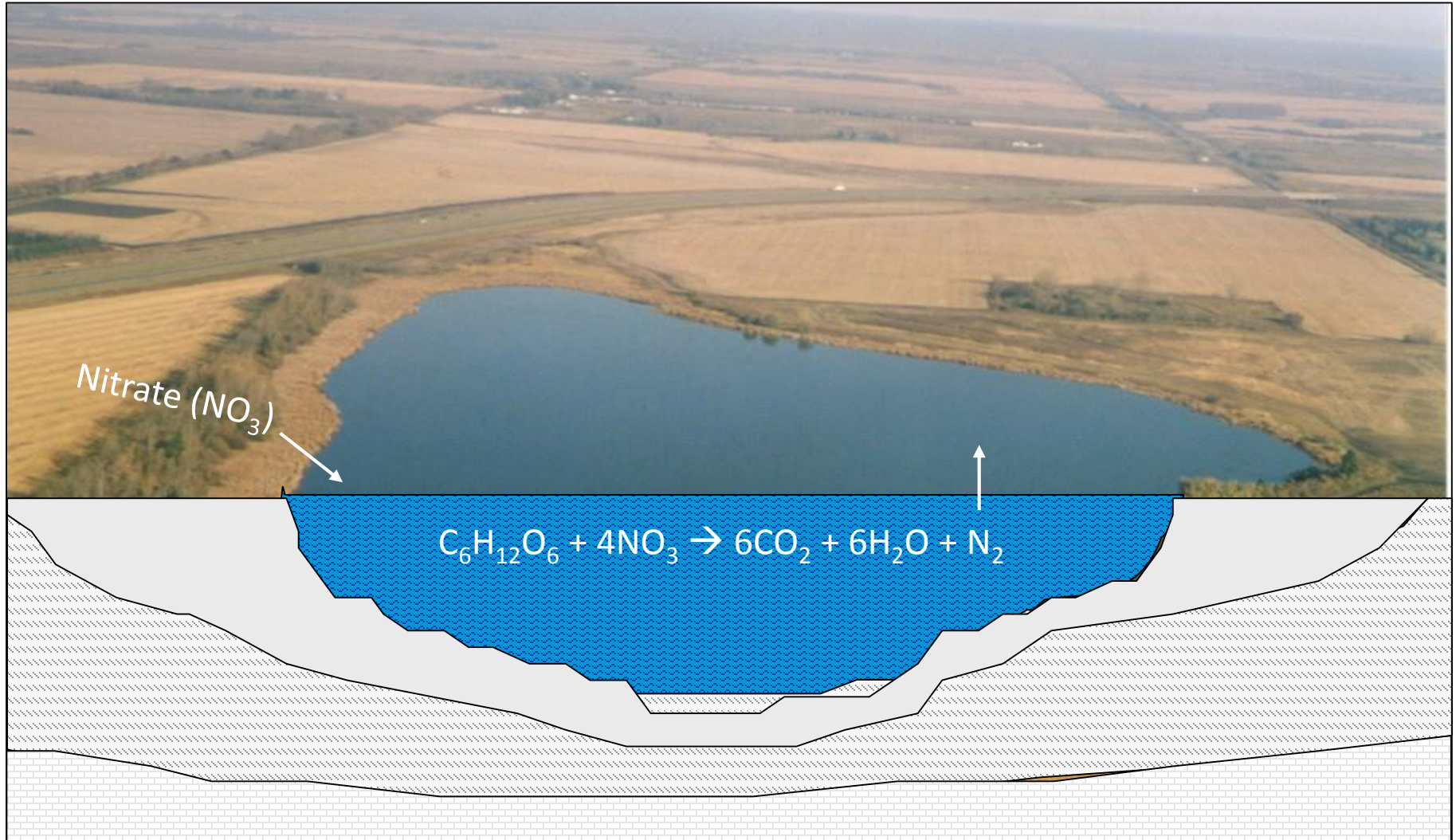


Image courtesy of Richard Weber

Benefit: Groundwater (Aquifer) Recharge

Chemical: Denitrification



Benefit: Downstream Water Quality

Biological: Plant Growth



Benefit: Downstream Water Quality, Habitat

Wetland Functions and Values



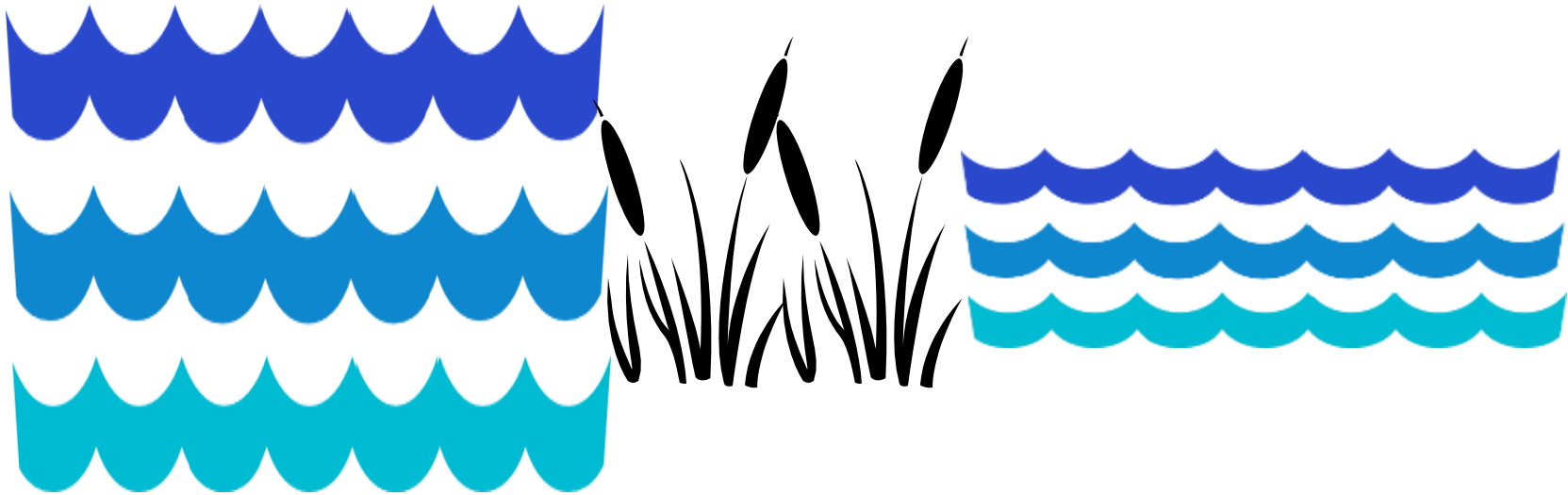
Coastal Marsh - Virginia

Physical: Energy Dissipation

Open water



Shoreline



Benefit: Shoreline Erosion Control

Biological: Plant Growth



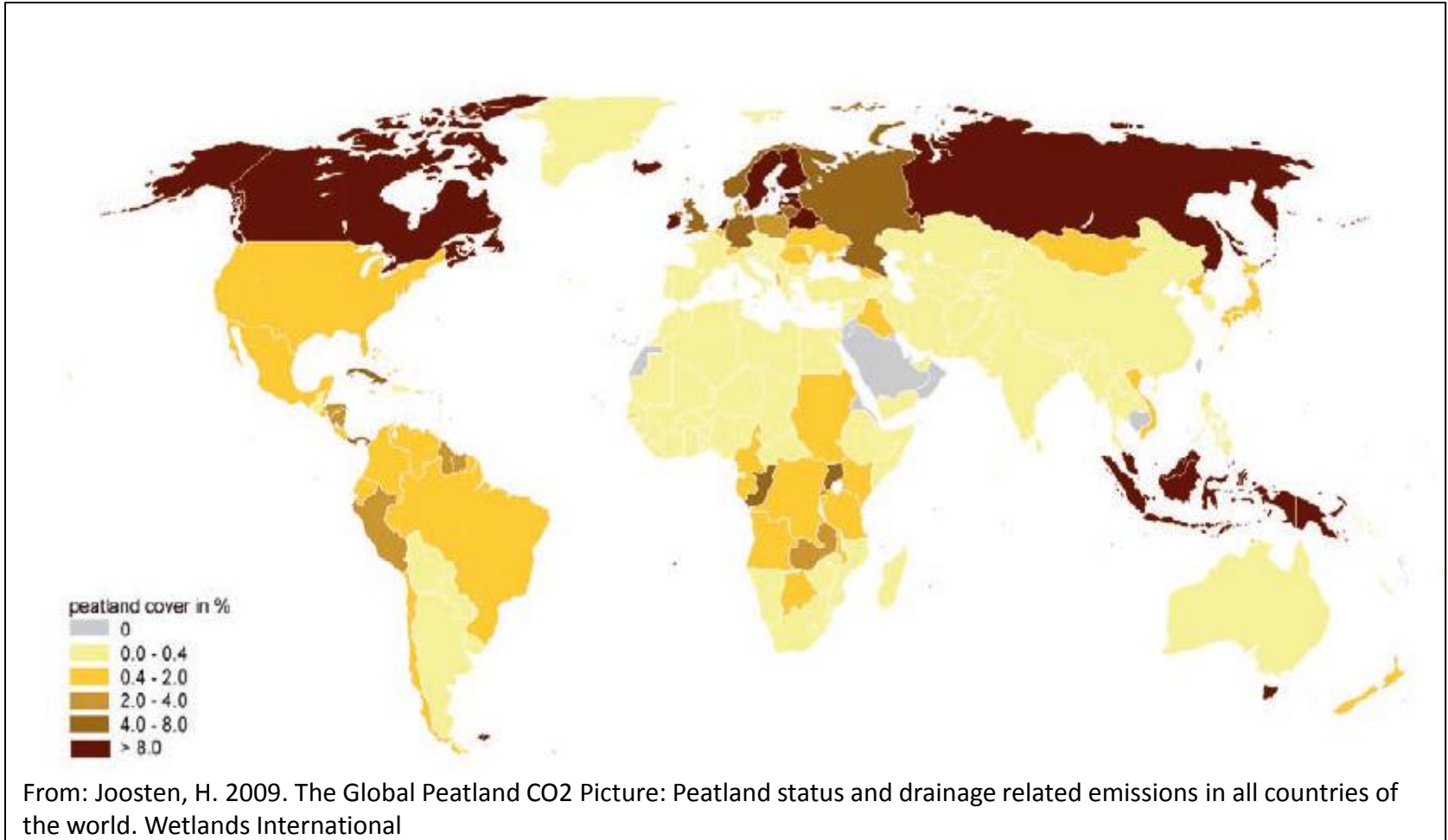
Benefit: Habitat

Wetland Functions and Values



Bog (Peatland)

Biological: Carbon Accumulation



Benefit: Climate change remediation

Biological: Carbon Accumulation



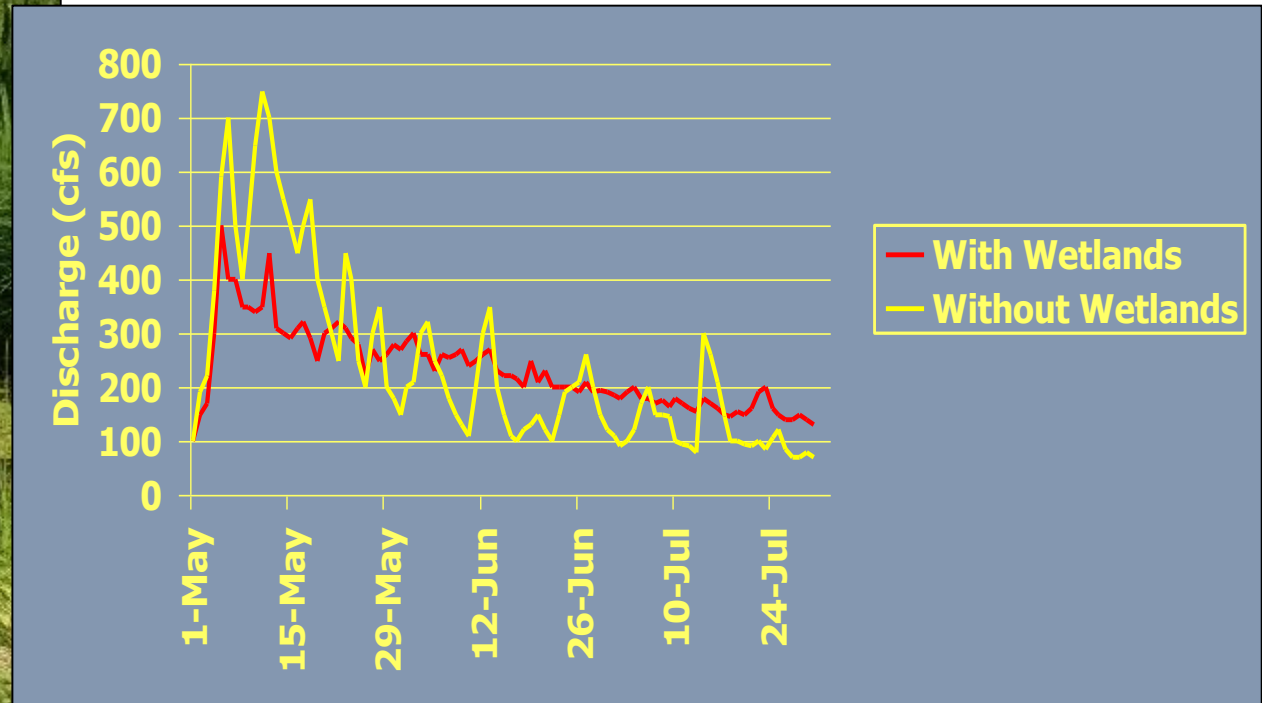
Forested Swamp - Virginia

Physical: Water Storage



Benefit: Flood Attenuation

Physical: Groundwater Discharge



Benefits: Stream Flow Moderation (Habitat, Water Supply)

Altered Wetlands (Systems)



Altered Wetlands (Systems)

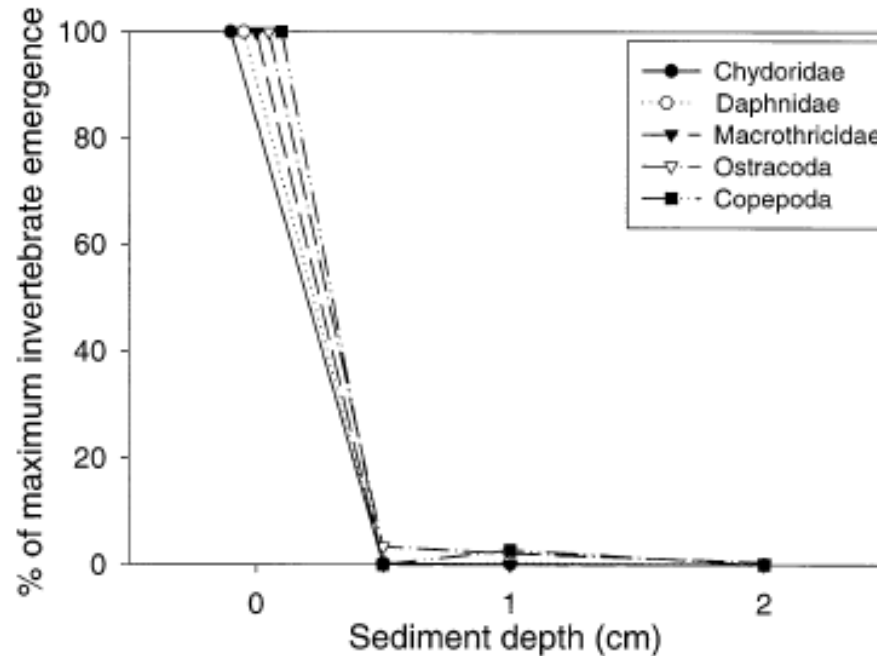


Figure 3. Effect of sediment depth on percent maximum emergence of invertebrate taxa. Percent emergence of invertebrates in the 0.5-, 1-, and 2-cm treatments is relative to maximum emergence of invertebrates in the 0-cm treatment.

From: Gleason, R., N. Euliss, D. Hubbard, and W. Duffy. 2003. Effects of sediment load on emergence of aquatic invertebrates and plants from wetland soil egg and seed banks. *Wetlands* **23**:26-34.

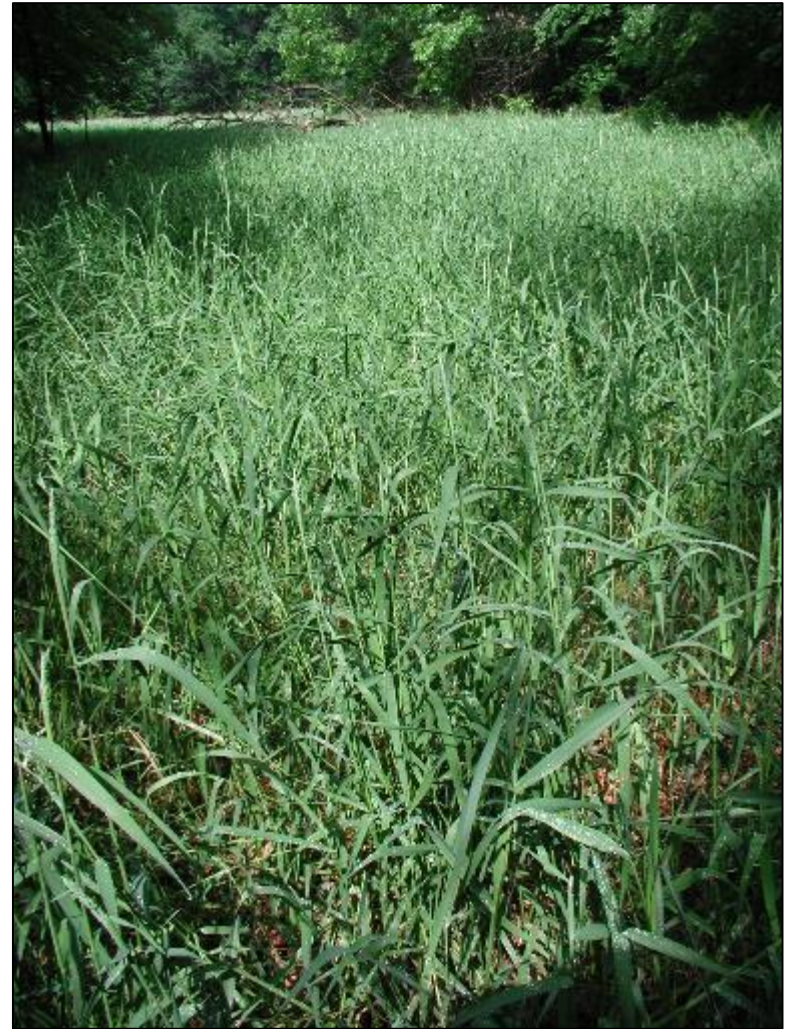
Altered Wetlands (Systems)



Altered Wetlands (Systems)



Hybrid cattail (*Typha x. glauca*)



Reed canarygrass (*Phalaris arundinaceae*)

Classification Systems

FWS/OBS-7001
DECEMBER 1979
Reprinted 1992

Classification of Wetlands and Deepwater Habitats of the United States



U.S. Department of the Interior
Fish and Wildlife Service

- System (Landscape)
 - Class (Vegetation)
 - Modifier (Hydrology, Chemistry, Soils)
- Lacustrine
 - Emergent
 - Permanently flooded

National Wetland Inventory



Classification Systems

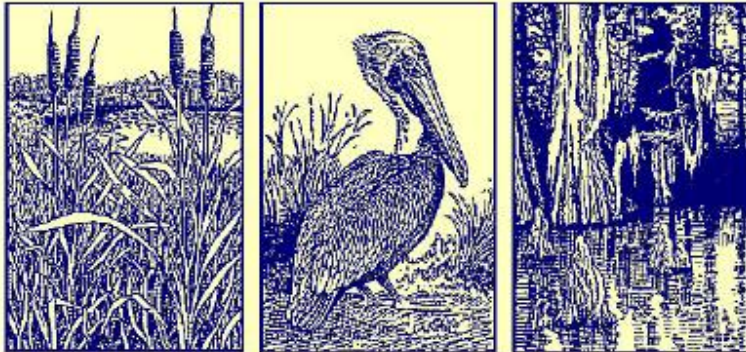


US Army Corps
of Engineers
Waterways Experiment
Station

Wetlands Research Program Technical Report WRP-DE-4

A Hydrogeomorphic Classification for Wetlands

by Mark M. Brinson

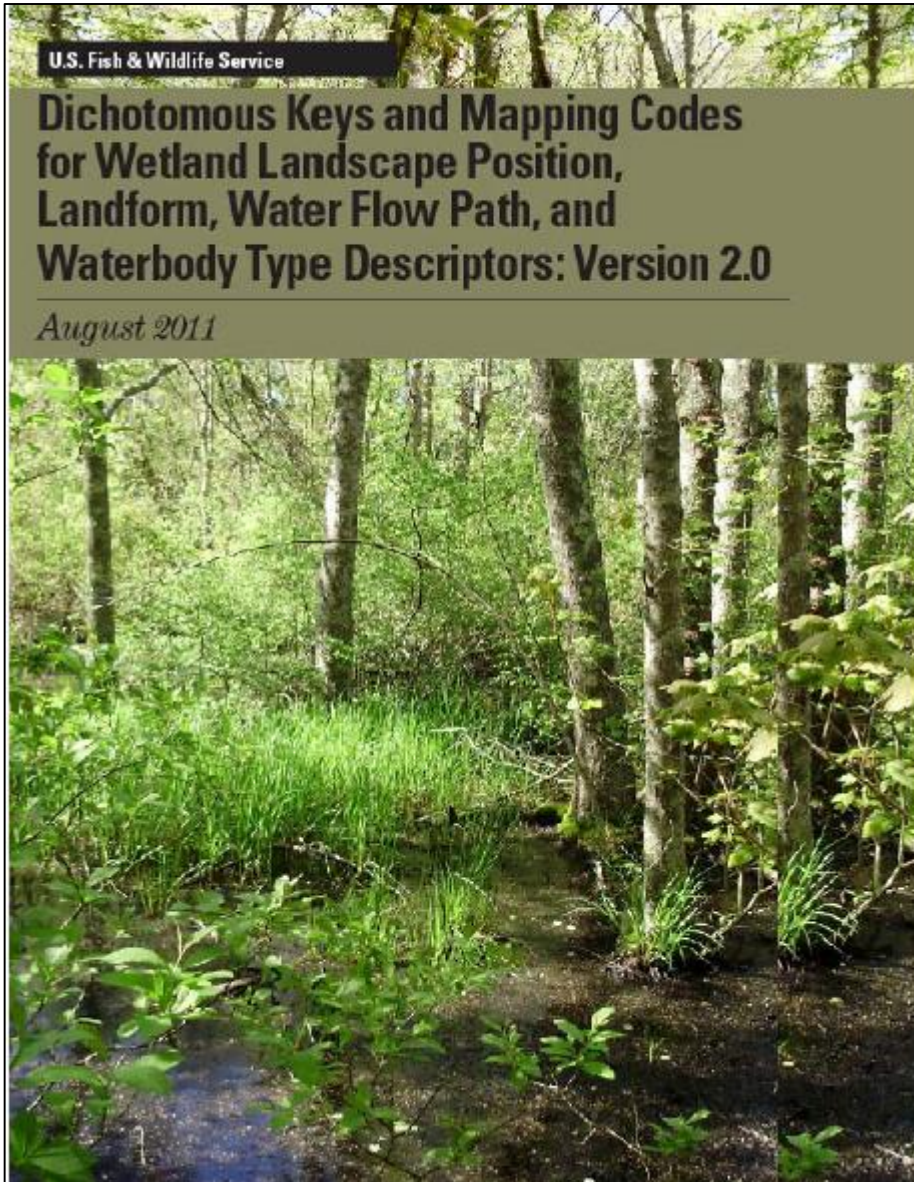


August 1993 – Final Report
Approved For Public Release, Distribution is Unlimited



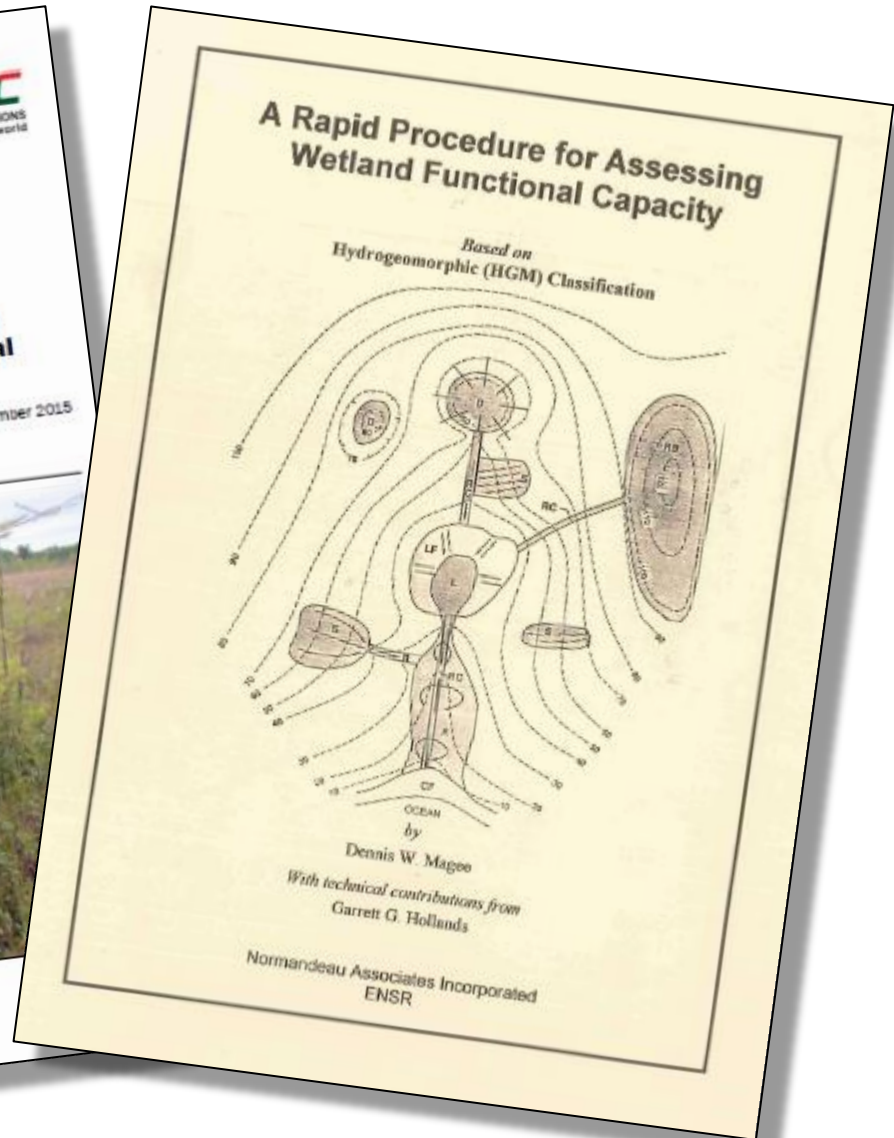
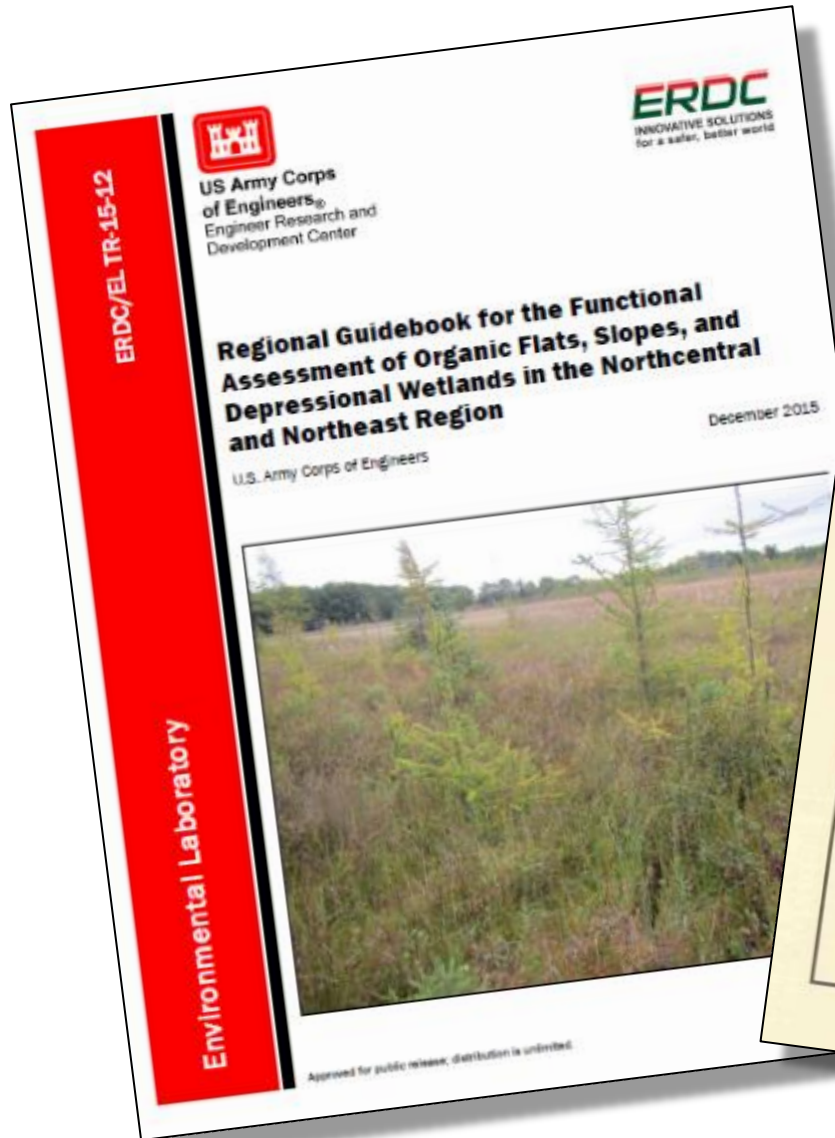
- Geomorphic Setting
(ex: Lacustrine Fringe)
- Water Source
(ex: Lateral Surface)
- Hydrodynamics
(ex: Bidirectional)

Classification Systems

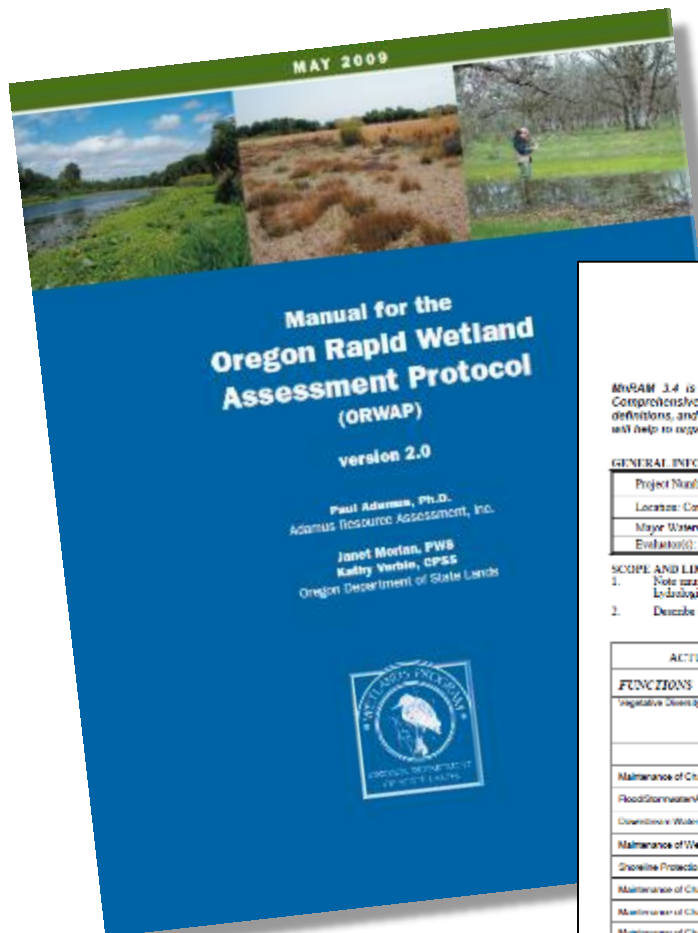


- LLWW (Tiner)
- Applies HGM-type descriptors to NWI data
- Landscape level functional assessment

Functional Assessment Methods



Functional Assessment Methods



(Issued 9/15/10)

MnRAM 3.4 FOR EVALUATING WETLAND FUNCTIONS

MnRAM 3.4 is designed to help assess functions and values associated with Minnesota wetlands. The Comprehensive Guidance document (available at www.dnr.state.mn.us) contains explanations, references, definitions, and a rating format for each function. After using this tool, the Management Classification Reference will help to organize the results for managing local wetland resources.

GENERAL INFORMATION:

Project Number or Name:		Wetland Number:	
Location: County:	Section:	Township:	Range:
Major Watershed:	Subwatershed:	City:	
Evaluator(s):	Date of Site Visit:		

SCOPE AND LIMITATIONS:

- Note natural climatic conditions experienced during this assessment due to seasonal considerations and/or natural existing hydrologic and climatic conditions.
- Describe the purpose of this assessment: inventory/planning/monitoring/regulatory/classification.

SUMMARY TABLE

ACTUAL CONDITIONS FUNCTIONS (and Related Values)	FUNCTIONAL INDEX**	
	HA	Functional Index Score Comments
Vegetative Characteristics*		
Plant Group #1		
Plant Group #2		
Plant Group #3		
Maintenance of Characteristic Hydrologic Regime		
Flood Stormwater Attenuation		
Downstream Water Quality		
Maintenance of Wetland Water Quality		
Shoreline Protection		
Maintenance of Characteristic Wildlife Habitat Structure		
Maintenance of Characteristic Fish Habitat		
Maintenance of Characteristic Amphibian Habitat		
Aesthetics/Recreation/Education/Cultural		
Conservation Values		
Groundwater Interaction		
Additional Information		
Wetland Restoration Potential		
Suitability to Stormwater and Urban Development		
Additional Information - Unrelated Functions		

*The functional index may be calculated manually using formulas in the Comprehensive Guidance.

**If more than 3 plant communities are present, use an additional summary table.

1

