

Enhancing Wetlands Inventory Data for Watershed-based Wetland Characterizations and Functional Assessments

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Background

- ◆ NWI maps - 90% of coterminous US; 34% Alaska
- ◆ NWI digits - 44% coterminous US; 13% AK
- ◆ FWS classification (1979)- vegetation, hydrology, salinity, soils, and impacts
- ◆ FWS classification shortcomings - no separation by hydrogeomorphology which is impt. for determining certain functions
- ◆ Brinson's HGM classification system (1993) - hydrologic and geomorphic controls influencing wetland functions

Background (cont'd)

- ◆ HGM approach will develop models or functional profiles of certain types for use in functional assessment
- ◆ Availability of profiles in future will be an asset to functional assessment

Needs

- ◆ Preliminary watershed-based assessment of wetland functions
- ◆ Better characterization of wetlands for national database (enhanced NWI data)
- ◆ Help assess the significance of wetland losses re: functions lost
- ◆ Preliminary assessment of functions to be expected from potential wetland restoration sites including mitigation bank wetlands

Merging HGM with NWI

- ◆ Since 44% of NWI maps are digitized, adding a set of descriptors for HGM-types could be easily accomplished
- ◆ Descriptors for landscape position and landform would greatly enhance NWI information and allow use of HGM functional profiles in future
- ◆ These descriptors would permit watershed-based or regional assessments of wetland functions to be conducted based on existing knowledge of wetland functions

Hydrogeomorphic-type Descriptors

- ◆ Initially developed for use in assessing likely functions of potential wetland restoration sites in selected MA watersheds.
- ◆ Descriptors:
 - LANDSCAPE POSITION
 - LANDFORM
 - WATER FLOW PATH
 - Others

Landscape Position

- ◆ Describes the relationship between a wetland and an adjacent waterbody or not (isolated)
- ◆ Five positions:
 - TERRENE
 - LOTIC
 - LENTIC
 - ESTUARINE
 - MARINE

Landscape Position

- ◆ Terrene - wetlands not along a waterbody
- ◆ Lotic - wetlands in or along rivers and streams
 - Separate Rivers from Streams
 - Gradients: Tidal Gradient, High Gradient, Middle Gradient, and Low Gradient
 - Modifiers for Perennial, Intermittent, Headwater, and Channelization (excavated/modified stream course)
- ◆ Lentic - wetlands in or along lakes (in lake basin)

Landscape Position (cont'd)

- ◆ Estuarine - wetlands in estuaries
- ◆ Marine - wetlands along ocean shorelines

Landform

- ◆ Describes the shape or physical form of wetlands
 - SLOPE
 - BASIN
 - FLAT
 - FLOODPLAIN
 - INTERFLUVE
 - FRINGE
 - ISLAND

Inland Landforms

◆ Slope Wetland

- Paludified, Isolated, Inflow, Outflow, and Throughflow
- Modifiers for inflows and outflows: Channelized (stream or river) and Nonchannelized (contiguous wetland or suspected subsurface flow to downslope wetland)

◆ Basin Wetland

- Isolated, Inflow, Outflow, and Throughflow
- Modifiers: Beaver, Human-created, Partly Drained, Headwater, Drainage-divide, and Vernal Pool; for inflows and outflows--Channelized (stream or river), Non-channelized (contiguous wetland or suspected subsurface flow to neighboring wetland)

Inland Landforms (cont'd)

◆ Flat Wetland

- Paludified, Isolated, Inflow, Throughflow, and Outflow
- Modifiers: Partly Drained; for inflows and outflows--
channelized (stream or river) or nonchannelized
(contiguous wetland or suspected subsurface flow to
neighboring wetland)

◆ Floodplain Wetland

- Basin, Oxbow, and Flat; Former Floodplain Basin, etc.

◆ Interfluve Wetland

- Basin, Carolina Bay, and Flat

Inland Landforms (cont'd)

- ◆ Fringe Wetland

- River Island, Stream Island, River, Stream, Pond, Lake, Barrier Island, and Barrier Beach

- ◆ Island Wetland

- Delta, River, Stream, Lake, and Pond

Coastal Landforms

- ◆ Island Wetland

- Delta, River, and Bay

- ◆ Fringe Wetland

- Barrier Island, Barrier Beach, Bay, Bay Island, Coastal Pond, Coastal Pond Island, River, River Island, Ocean Island, and Headland (Modifier for Overwash)

- ◆ Basin Wetland

- Modifiers: Human-induced (managed fish and wildlife area, salt hay, tidally restricted-road, tidally restricted-railroad, road crossing [significant tidal restriction not suspected], railroad crossing, and others to be determined)

Classification of Major U.S. Wetland Types

- ◆ Prairie Potholes - Terrene Basin Wetlands (Isolated, Outflow, Throughflow, Inflow; Partly Drained modifier; *could add "Pothole" modifier*)
- ◆ Playas - Terrene Basin Wetlands (Isolated, etc.; *could add "Playa" modifier*)
- ◆ Pocosins - Terrene Interfluve Basin Wetlands (Partly Drained modifier; *"Pocosin" modifier*)
- ◆ Carolina Bay - Terrene Interfluve Basin Wetland or Terrene Basin Wetland (*with Carolina Bay designation*)

Classification of Major U.S Wetland Types (cont'd)

- ◆ Nontidal Marshes - many possibilities depending on whether isolated (Terrene) or along a waterbody (*river/stream-Lotic; lake-Lentic*); mostly Basin types
- ◆ Fens - same as for nontidal marshes; mostly Basins
- ◆ Bogs - many possibilities (*may add modifiers for types of bogs such as raised bogs, lake-fill bogs, plateau bogs, etc.*): mostly Basins and Slopes
- ◆ Muskegs/Wet Tundra - probably Terrene Paludified Slope or Paludified Flat Wetlands (*may need category for Paludified Basin Wetlands*)

Classification of Major U.S. Wetland Types (cont'd)

- ◆ River Swamps and Floodplain Wetlands - Lotic River Low/Middle Gradient Floodplain Basin or Flat Wetlands
- ◆ River Marshes - Lotic Low or Middle Gradient River Fringe or River Island Fringe Wetlands
- ◆ Flatwoods - Terrene Interfluvial Flat Wetlands (may include Basin Wetlands)
- ◆ Cypress Domes - Terrene Basin Wetlands (*could add modifier for Cypress Domes*)
- ◆ Riparian Wetlands - Lotic River Floodplain Wetlands; Lotic Stream Flat Wetlands; *if along lake, then Lentic Flat Wetlands*

Classification of Major U.S. Wetland Types (cont'd)

- ◆ Salt and Brackish Tidal Marshes - Estuarine Fringe Wetlands (*different types designated such as Barrier Island/Beach Fringe, Bay Fringe, River Fringe, Coastal Pond Fringe, Headland Fringe, Bay Island Fringe, etc.; modifier for overwash areas*), or Estuarine Basin Wetlands (*where impounded purposely or where sheet flow is interrupted by roads/railroads; designate human-induced modifiers for managed fish/wildlife areas, salt hay, tidally restricted, road crossing, etc.*)

Classification of Major U.S. Wetland Types (cont'd)

- ◆ Mangrove Swamps - Estuarine Fringe Wetlands and Estuarine Basin Wetlands (*designate diff. types like Bay Fringe, River Fringe, etc.*)
- ◆ Freshwater Tidal Marshes and Swamps - Lotic Tidal Gradient Fringe or Floodplain Wetlands

Information Gained from Descriptors

- ◆ Headwater Wetlands (*including Drainage-divide Wetlands serving 2 watersheds*)
- ◆ Isolated Wetlands
- ◆ Wetlands associated with Streams & Rivers
- ◆ Wetlands in lake basins
- ◆ Floodplain Wetlands
- ◆ Overwash Wetlands
- ◆ Special types of Wetlands - Carolina Bay, Pocosin, Prairie Pothole, Vernal Pool

Information Gained from Descriptors (cont'd)

- ◆ Separation of stream-associated wetlands by stream gradients
- ◆ Linking of Wetlands to Functions
- ◆ Possible identification of likely vegetation community and associated wildlife
- ◆ Better handle on the actual number of individual wetlands in a given area
- ◆ Develop a watershed perspective of the integrated wetland ecosystem

Functional Assessment Potential

- ◆ Preliminary Assessment (subject to field verification)
- ◆ Consider Possible Functions
 - Surface Water Detention
 - Stream Flow Maintenance
 - Nutrient Cycling
 - Retention of Sediments and Other Particulates
 - Shoreline Stabilization
 - Fish and Wildlife Habitat
- ◆ Categorize for Each Wetland Type
- ◆ Apply to Watershed = Watershed-based Preliminary Assessment of Wetland Functions

Coupling Wetland Characteristics with Wetland Functions

- ◆ Develop Correlations Based on Existing Knowledge and Input from Local/Regional Experts
- ◆ Prepare Protocols for Database Analysis
- ◆ Analyze Data
- ◆ Generate Draft Watershed-based Report
- ◆ Peer Review/Field Review
- ◆ More Data Analysis, as needed
- ◆ Produce Final Report - Wetland Characterization and Preliminary Assessment of Wetland Functions

Correlating Characteristics to Functions

◆ Surface Water Detention

- Lotic Basin and Floodplain Wetlands
- Lentic Wetlands
- ?Terrene Outflow Basin Wetlands (local importance?)

◆ Streamflow Maintenance

- Terrene Outflow Wetlands (= headwater)
- Lotic Basin Headwater Wetlands
- Lentic Wetlands
- ?Broad Lotic Floodplain Wetlands

Functional Correlations (cont'd)

◆ Nutrient Cycling

- Organic Soils
- Hydric Mineral Soils w/high OM content
- Seasonally Flooded and wetter Lotic and Lentic Wetlands
- ?Terrene Outflow Basin and Slope Wetlands

Functional Correlations (cont'd)

- ◆ Retention of Sediments and Other Particulates
 - Lotic Basin and Floodplain Wetlands
 - Estuarine Fringe and Basin Wetlands
 - Moderate
 - ❖ Terrene Outflow Basins, Lentic Wetlands, Lotic Flats
 - ?Terrene Isolated Basins (local importance?)

Functional Correlations (cont'd)

- ◆ Coastal Storm Surge Detention and Shoreline Stabilization
 - Estuarine Vegetated Wetlands
 - Seasonally Flooded Palustrine Tidal Wetlands
 - ?Estuarine Nonvegetated Wetlands
- ◆ Inland Shoreline Stabilization
 - Lotic Vegetated Wetlands (excluding Island Wetlands)
 - Lentic Vegetated Wetlands

Functional Correlations (cont'd)

◆ Fish Habitat

- Coastal Fishes = Estuarine Wetlands
 - ❖ Intertidal Vegetated Rocky Shores
(some potential - ME)
- Freshwater Fishes = Semipermanently Flooded Lotic and Lentic Wetlands
 - ❖ Forested and Shrub-dominated Lotic-Stream Wetlands (moderating stream temperatures)
 - ❖ Forested Floodplain Wetlands

Functional Correlations (cont'd)

- ◆ Waterfowl and Waterbird Habitat
 - Estuarine Wetlands (including Eelgrass Beds)
 - Semipermanently Flooded Lotic and Lentic Wetlands
 - Beaver-influenced Wetlands
 - Impounded Wetlands
 - Seasonally Flooded Lentic and Lotic Wetlands (some potential)

Functional Correlations (cont'd)

◆ Other Wildlife Habitat

- Large Wetlands (8 ha; 20a)
- Smaller Diverse Wetlands
- Areas w/many Small Wetlands (vernal pools?)
- Urban Wetlands

◆ Biodiversity

- Rare/uncommon Types
- Large Diverse Wetland Complexes
- Unusual Formations

Example of Products

- ◆ Watershed-based Characterization Report
- ◆ Maps highlighting wetlands by type and function
- ◆ Geospatial Database for additional analyses

Characterization

- ◆ Description/Acreage Summary of NWI Wetlands and HGM-type Wetlands
- ◆ Correlation Wetland Characteristics and Functions
- ◆ Acreage Summary of Wetlands by Function (highlighting wetlands of potential significance)
- ◆ Maps Showing Wetlands of Potential Significance for Each Function

Maps

Showing:

- ◆ NWI Wetlands (Vegetation/Substrate, Hydrology, Water Chemistry, etc.)
- ◆ Wetlands by HGM-type (Landscape Position, Landform, and Water Flow Path)
- ◆ Potentially Significant Wetlands by Function

Bottom Line

- ◆ Provides a Big Picture View of the Wetland Resource
- ◆ Creates a Baseline from which more Detailed Investigations and Analyses can be carried out
- ◆ Helps Local Governments Understand the Significance of Wetlands (collectively/individually)
- ◆ Provides a Framework for Regional/Local Planning and a Tool for Improving Wetland Management
- ◆ Improves Public Awareness of Wetlands and Their Functions

For the Latest Information on this Methodology, Contact:

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