

Using and Communicating Wetland Functional Assessment Data

Based on a Landscape Level
Assessment Approach

Exploring Opportunities for Integrated Mapping and Functional Assessment of
Riverine and Coastal Floodplains and Wetlands

April 10, 2018

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Topics

- Landscape level inventory of wetland functions
 - Process
 - Improvements
 - Upgrades
- Potential uses of this information
 - Support watershed planning
 - Identify priority resource
 - Communication of key issues/information
- Incorporation of Floodplain Measures and Functions
 - River Bathymetry Toolkit
 - Stream Power Index
 - Modeled Best Management Practices

Wetland Functional Assessment

Goals and Objectives

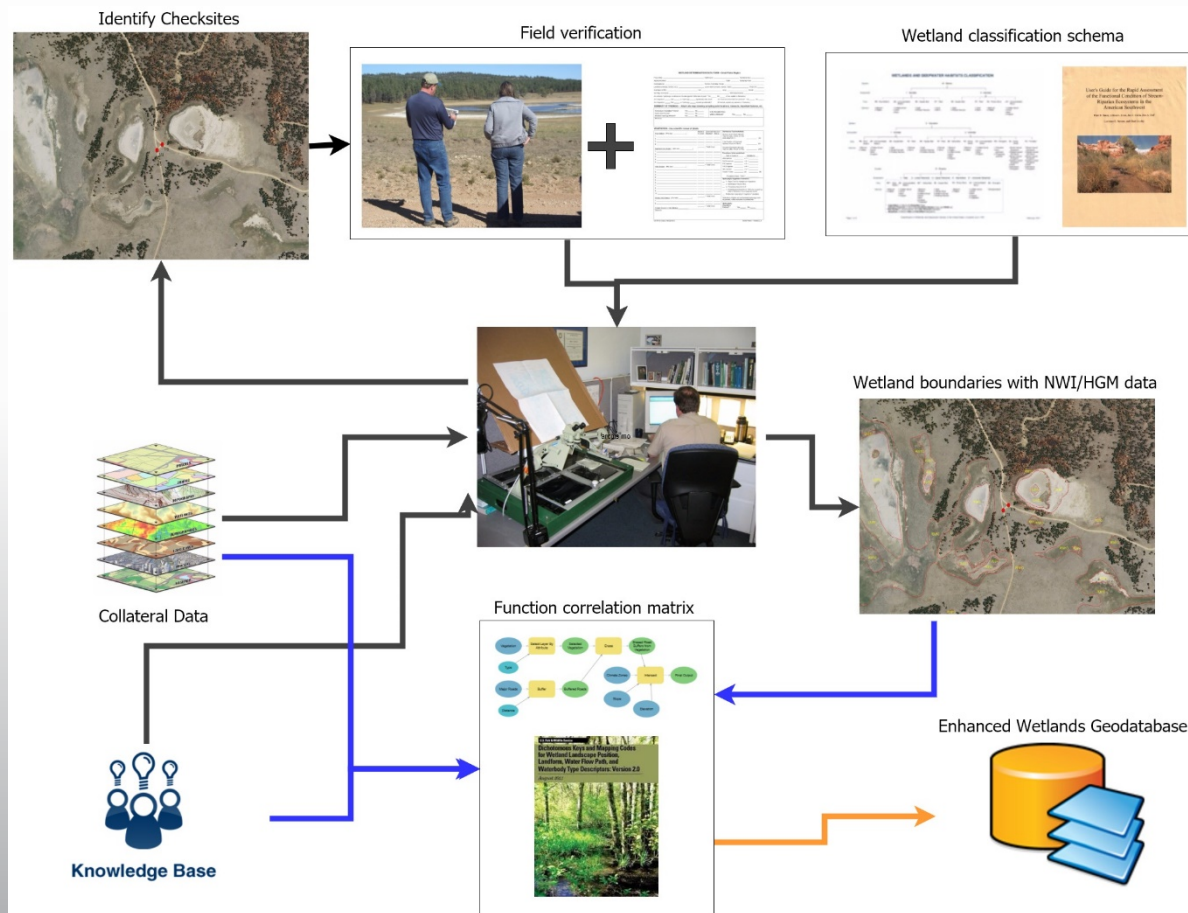
Provide an enhanced wetland spatial database to our partners and their stakeholders for use in watershed planning or wetland management.

- EPA Core Elements Framework
 - Current science, tools and methods
-
- Fine-tuned through a collaborative approach to wetland assessment and management activities based on:
 - Professional guidance and review
 - Stakeholder engagement

Wetlands Geodatabase

- Map polygonal and linear wetland features on the landscape
 - Accurately delineate shape and size based on imagery and collateral data
 - Attribute with
 - NWI Plus
 - Hydrogeomorphic metrics
 - Qualitative function assessment
- Map and classify riparian features using the USFWS Western Riparian Classification System
- Adhere to National Data Standards
 - NWI
 - FGDC

Wetland Functional Assessment Data Development



Data Attributes

- Cowardin (1979)
- Landscape Position, Landform, Waterbody, Water Flow Path (LLWW)
 - Classifies wetlands in terms of:
 - Landscape Position - relationship between a wetland and an adjacent waterbody or not
 - Landform - shape or physical form (island, basin, floodplain, etc.)
 - Water Flow Path - directional flow of water (outflow, inflow, isolated, etc.)
 - Water Body Type – lake, pond, river, stream
- Descriptive
 - Condition
 - Location
- Others as requested
 - HGM

Function Correlation

Which wetlands perform which functions and at what level (significance)?

- Collaborative/iterative process
- Develop functional correlation table:
 - Utilize local wetland professionals – “bpj”
 - Establish wetland functions to be assessed
 - Correlate wetland descriptors to functions
- Use existing or previous work as reference
- Link to Rapid Assessment Methods
 - Collect additional data, tie to HGM
- Result is each wetland polygon is ranked “high” or “moderate”



Potential Wetland Functions

Water Quality Functions

- Carbon Sequestration
- Energy Dissipation
- Groundwater Recharge
- Nutrient Transformation
- Sediment/Particulate Retention
- Shoreline Stabilization
- Streamflow Maintenance
- Surface Water Detention

Habitat Support Functions

- Amphibian Habitat
- Aquatic Invertebrate Habitat
- Fish Habitat
- Migratory Bird Habitat
- Shorebird Habitat
- Waterfowl Habitat
- Water Bird Habitat
- Woodcock Habitat
- Other Wildlife Habitat
- Conservation of Biodiversity

Example Correlation

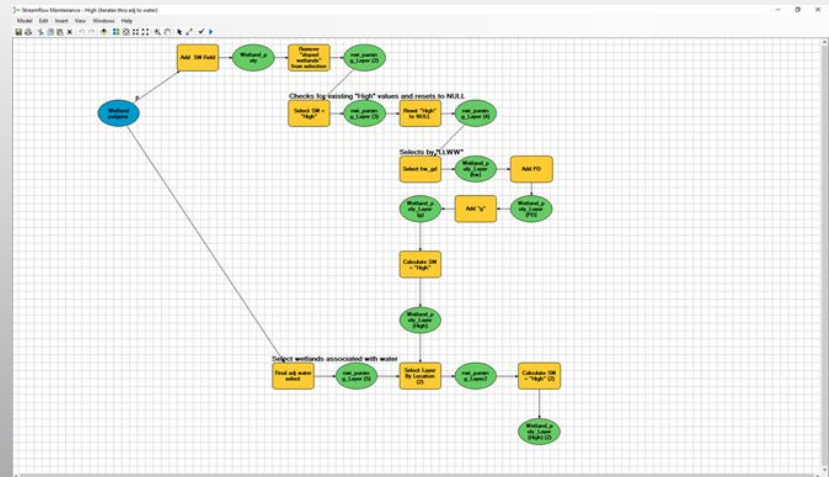
Streamflow Maintenance function

- High
 - All headwater wetlands
 - Vegetated wetlands along streams, rivers, lakes
 - Terrene pond wetlands with through or outflow
 - All wetlands with organic soil adjacent to 3rd order or higher streams
- Moderate
 - Terrene basin isolated or outflow vegetated wetlands
 - All wetlands with mineral soil adjacent to 3rd order or higher streams
 - Other wetlands adjacent to lakes not already included in High

Assigning Function Attributes to Wetland Data

- Wetland polygons are attributed with functional categories using a series of SQL queries
- Spatial queries are used to make assignments based on adjacency and proximity
- Collateral data layers (e.g. stream order) also support function assignments

Wetland-Type to Wetland-Function Correlations¶		
Function (code):	Level-of-Function:	Wetland-Types:
Aquatic Invertebrate Habitat (AIB):	High:	L1; L2; F; G or H regime; L2AB; L2UB; (AB; EM; SS; FO); L2; (vegetated; AB; EM; SS; FO) H or G regime; PAIB (not excavated or impounded); PUB; (AB; EM; SS; FO); P; (UB; EM; SS; FO); H or G; R2AB or R2EM; R1; H; RV or ST and F; G or H regime; LEB Agl (playa = L2USC; LEB Rgl; R1B5C reaches with bear wetlands or adjacent vegetated wetlands (C or wetter); F; F and adjacent to PD (PD1; PD2); PD1 and h; PD2 and h; and PD4 only) associated with P; (UD; AB; EM; SS; FO); PD (PD1; PD2); 2b; PD2b; and 2k; and PD4) associated with P; (AB; EM; SS; FO); H.
	Moderate:	LE; and PEMIC (and mixes and contiguous with waterbody) or LR; and PEMIC (and mixes and contiguous with waterbody) or LS; and PEMIC (and mixes and contiguous with waterbody); All PD not already selected as High; ¶ TETrad (alone ponds); PAD (impounded or excavated and not associated with PD); c,d,e,f and g); LR; FPb; P; USC or PUSF; All rivers or streams with C regime.
		NOTE: Exclude -A, B, J, and K regimes from High and Moderate.
Bank and Shoreline Stabilization (BSS):	High:	LR; (AB; EM; SS; FO and mixes; not LRH; and not "fin") or LS; (AB; EM; SS; FO and mixes and not "fin") or LE; (AB; EM; SS; FO and mixes; not LEE; and not "fin"); R; RS and L2RS.
	Moderate:	TE; pd; (AB; EM; SS; FO and mixes) or TE; Q; by; (AB; EM; SS; FO and mixes) excluding islands.
Carbon Sequestration (CAR):	High:	P; (AB; EM; SS; FO and mixes) (F; P; (vegetated) H or G; P; (AB; EM; SS; FO and mixes); C; P; Bg (and mixes); P; B (wetlands on organic soils); R; EMA or L2EM; A; PUB (and mixes; not L2EM; F or L2EM; C; L2AB; F or L2AB; G; P; B (permanently saturated types; bogs noted with "a"); R; AB with F; G or H regime; PAIB; G.
		NOTE: Exclude J regime wetlands and algal beds (AB1) from High.
	Moderate:	P; (EM; SS; FO and mixes) A or P; (EM; SS; FO and mixes) B (seasonally saturated types; permanently saturated types should be rated as High); R; EMA or L2EM; A; PUB (and mixes; and not PD1; b; c; e; f; and for PD1; b; c; e; f; and j); also exclude isolated impounded ponds); PUS; vegetated; L2US; vegetated.
		NOTE: Any wetlands with a J water regime and fanned wetlands (Q; D) from Moderate.



Supplementary Data Layers

- Terrain/Surface
 - Slope
 - Hillshade
- Water/flow drainage ditches
 - Elevation data (DEM or LiDAR)
 - Digitizing
- Synthetic stream network
 - Flow direction
 - Flow accumulation
- Potentially restorable wetlands (PRWs)
 - Extended SSURGO queries
 - Compound topographic Index (CTI)
 - Derived drainage ditches
- Local catchments

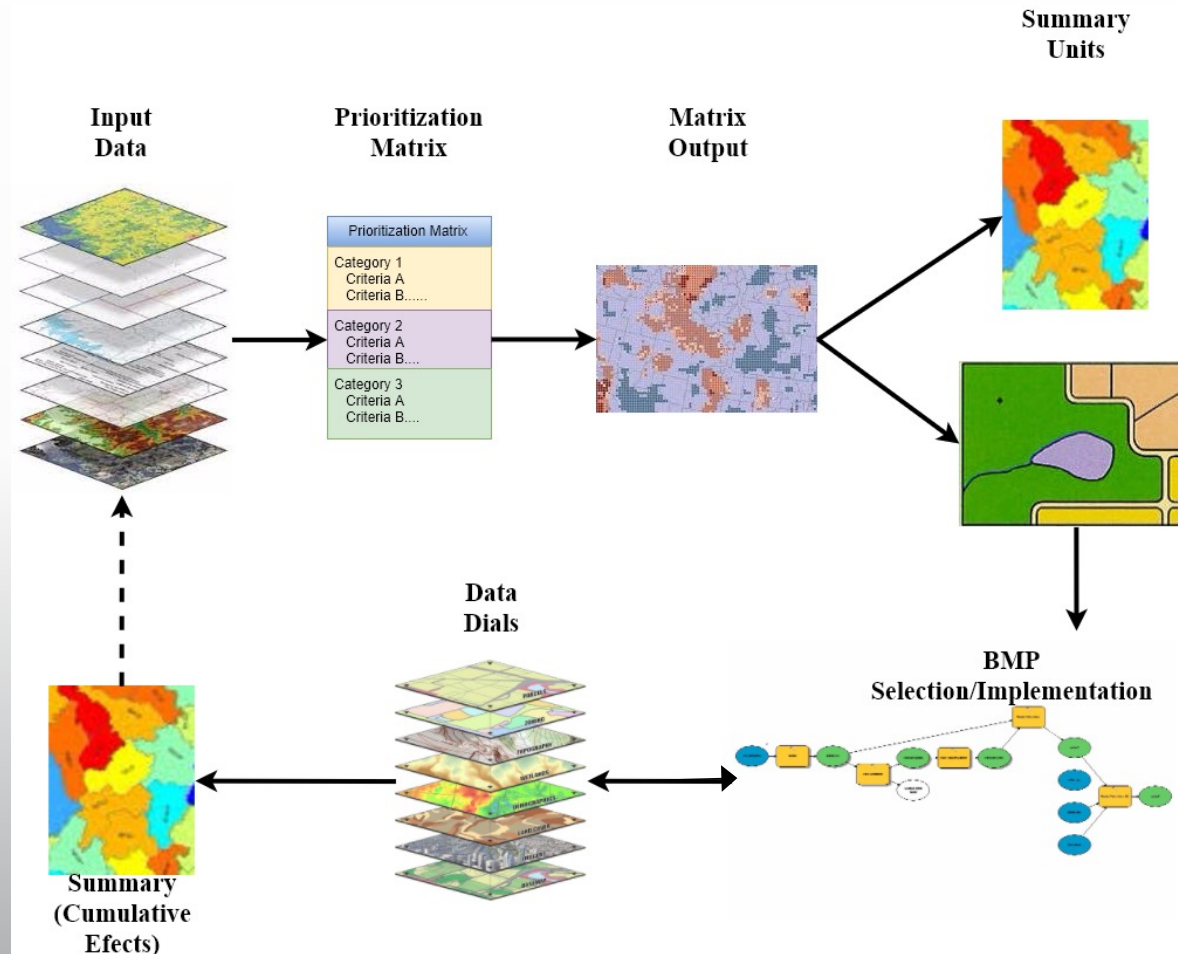
Data Caveats

- First and foremost this is a mapping exercise:
 - Landscape scale
 - Not designed to be a field delineation process
 - Result is a planning tool, not a watershed plan
- Delineation and characterization of wetlands from remote imagery is a interpretive and subjective process
 - Dependent on image quality and supporting collateral data
- Functional correlations are based on best professional judgment and require field validation
 - Two significance classes were used, Moderate and High
 - Wetlands identified as highly significant are predicted to be more significant in for performing a given function

Extending Wetland Functional Assessment: Nemadji River Watershed Toolkit

- Part of the Saint Louis River Estuary Area of Concern
 - Challenges
 - Deforestation
 - Wetland draining and filling
 - Stream bank degradation due to agriculture
 - Issues
 - Sedimentation
 - Erosion
 - Stream incision
- Address Remedial Action Plan (RAP)
 - the Loss of Fish and Wildlife Habitat Beneficial Use Impairment (BUI 9)

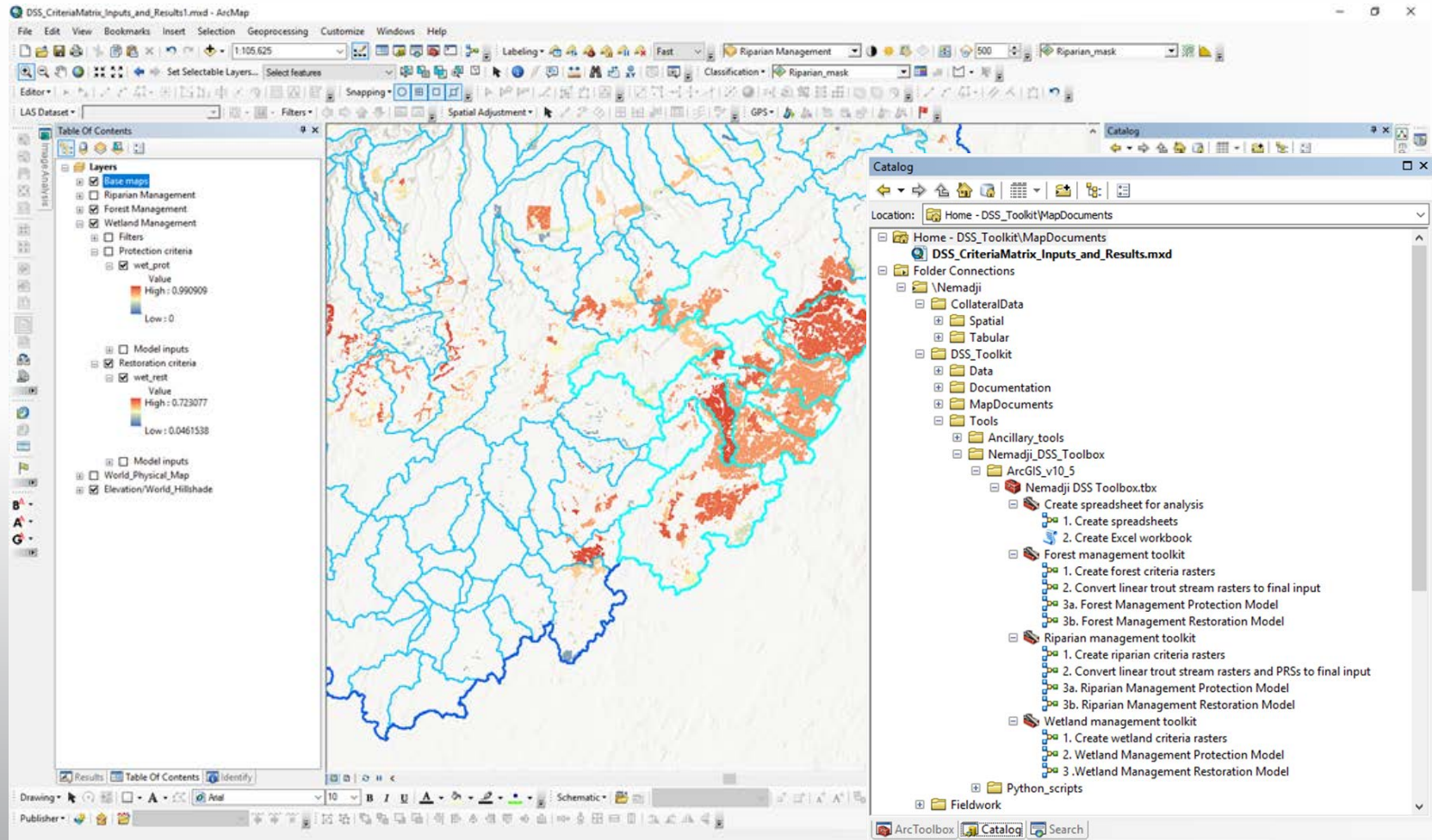
Proposed Workflow for Nemadji River Watershed Decision Toolkit



Nemadji River Watershed Decision Support Toolkit

- Selection/prioritization criteria matrix focused on activities
 - Protection
 - Forest habitat
 - Riparian habitat
 - Wetland habitat
 - Restoration
 - Forest habitat
 - Riparian habitat
 - Wetland habitat
- Suite of ArcGIS tools and Python scripts
 - Generate summary statistics for user-defined locations
 - Create new criteria data based on different weighting system
- Requires ArcGIS Advanced version 10.2 or higher
 - Spatial Analyst Extension
 - Geoprocessing options
 - Overwrite outputs and background processing enabled

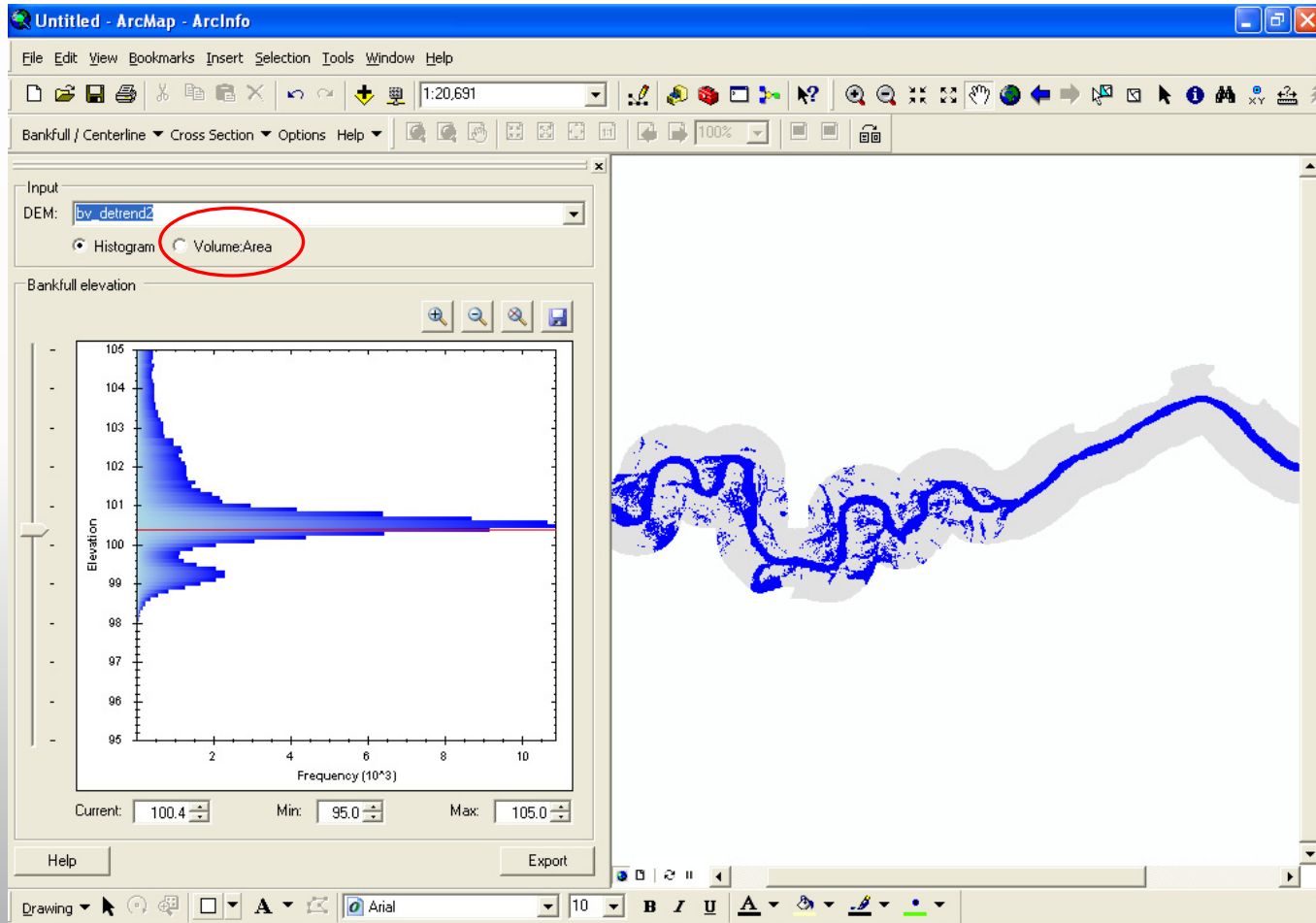
Basic Interface



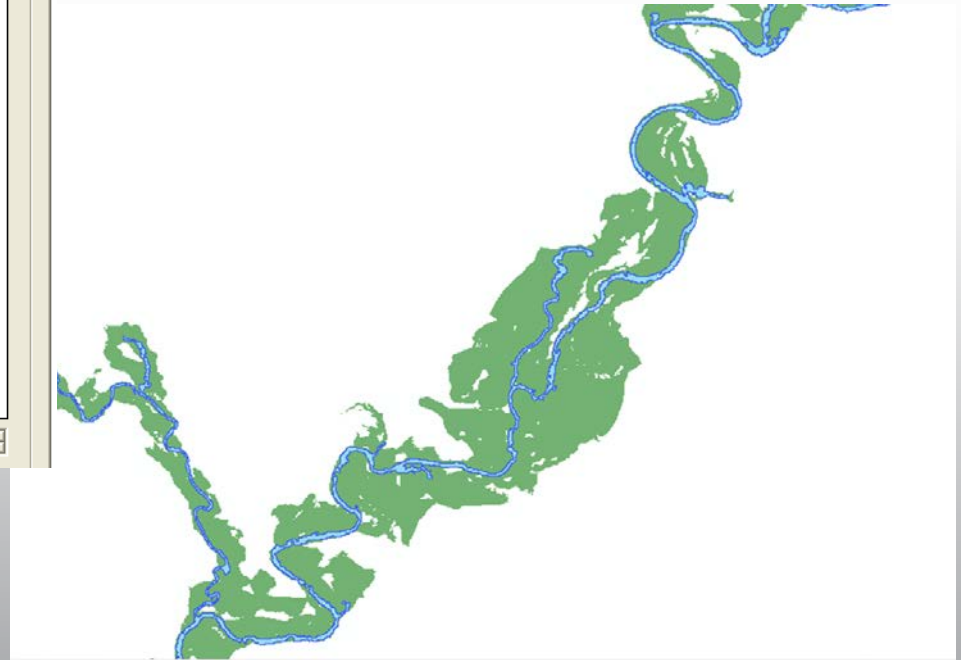
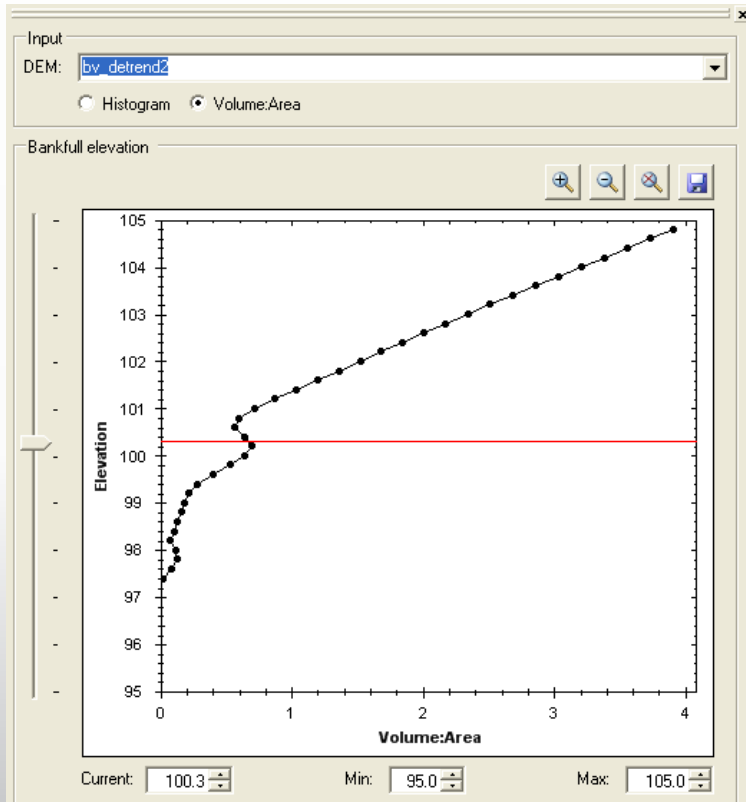
Using the Nemadji River Watershed Decision Toolkit in Riparian Areas



Creating the Functional Riparian Area



Creating the Functional Riparian Area

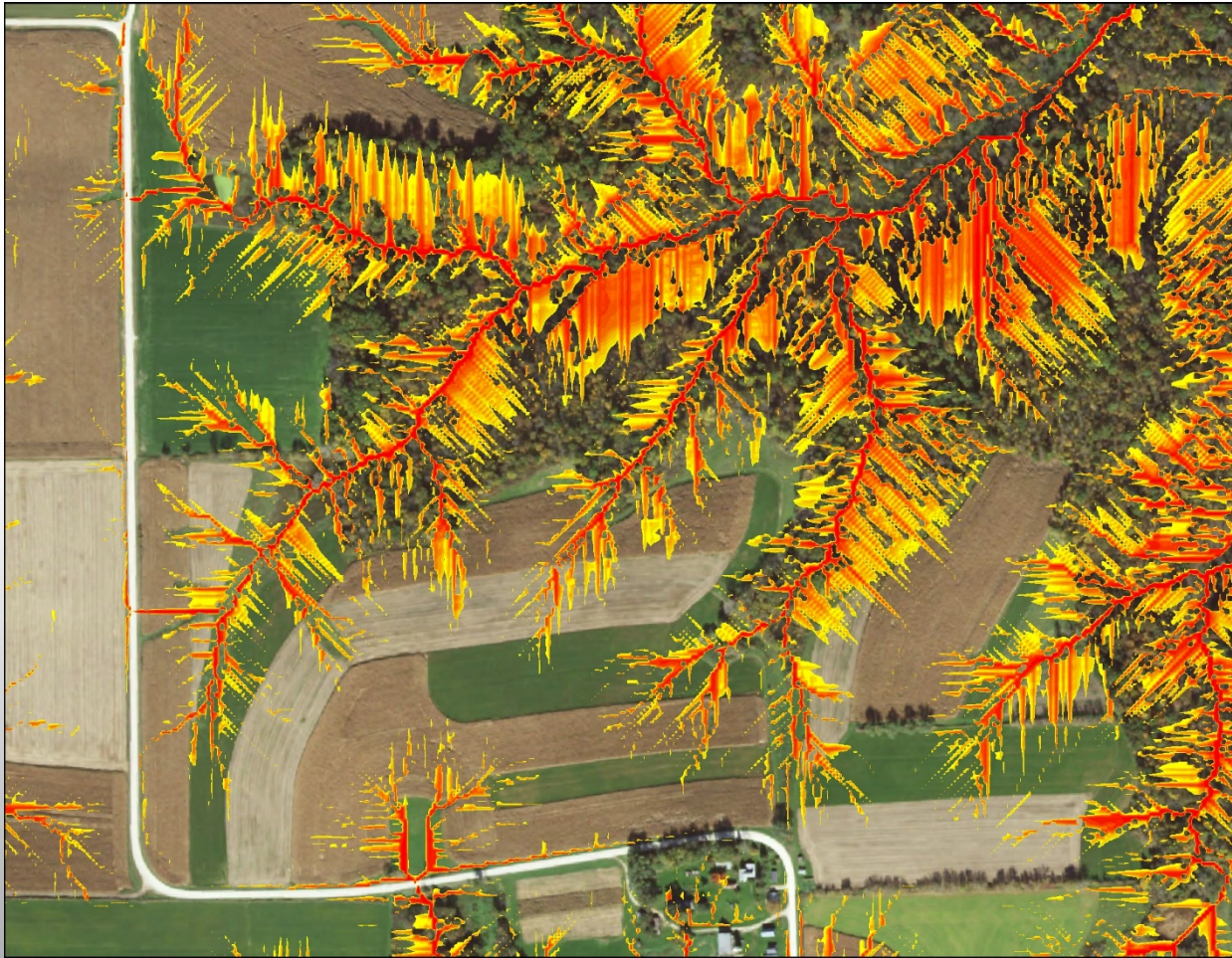


Example of BMP-based Prioritization Criteria

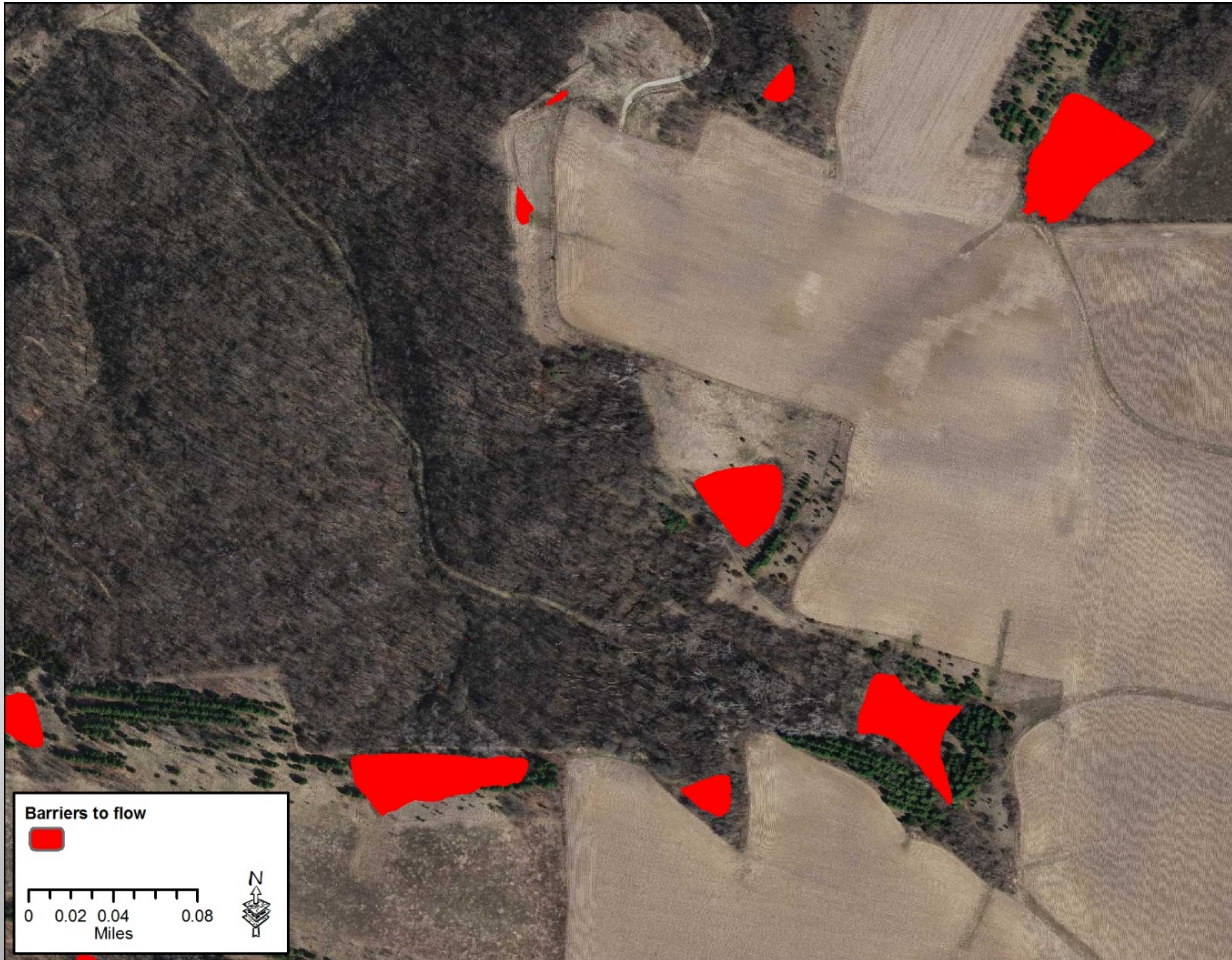
Riparian Area Restoration

- Potential BMPs
 - Installation of vegetated filter strips
 - Creation of detention basins
 - Stream bank armoring or pull-back
- Prioritization
 - Agricultural fields adjacent to areas of “high” SPI
 - Stream banks vulnerable to erosion
 - Potentially restorable wetlands
 - Existing wetland providing significant Erosion Protection and Sediment Retention functions

Sample Criteria Datasets: SPI



Sample Criteria Datasets: Existing Detention Ponds



Watershed Advocacy Partners

Comprehensive wetland assessment enabled advocacy groups to engage in proactive planning and site level prioritization and management

- Partners included Amigos Bravos and Western Environmental Law
- Mission: Protect and Restore the Waters of NM
- Stakeholders: Citizens, students, land owners, environmental activists, ranchers, communities
- Developed the Wetland Jewels Program to “Create resilience in the face of climate change through protection and restoration of mountain wetlands”



Site Restoration and Enhancement



Questions



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