



Wetlands by Design

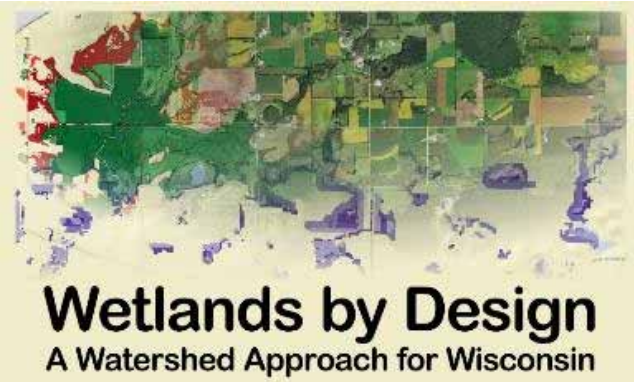
A Watershed Approach for Wisconsin

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²Conservation Strategies Group

³WI Department of Natural Resources



Why Wetlands?



Nitrate reduction: 5-10x more effective than upland practices

Multiple services: \$1.6M/acre/year

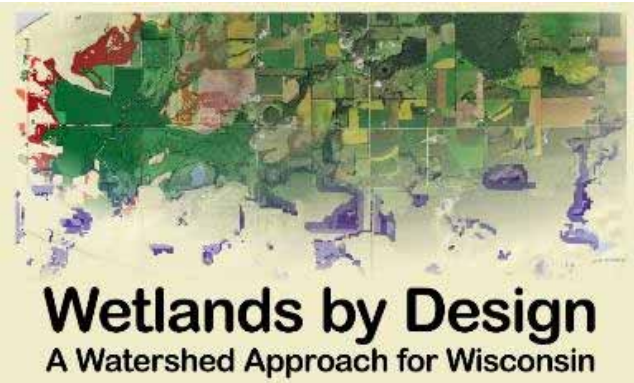
Multiple Services: valued 10x > any upland

Multiple Services: >\$3B/year

Flood abatement: flood costs reduced by 92%

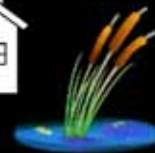
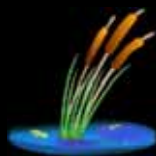
Multiple Services: Restoration value \$600/ac > current land use

Water quality: one treatment wetland saved \$282M



Wetland Services

Watershed Position & Context





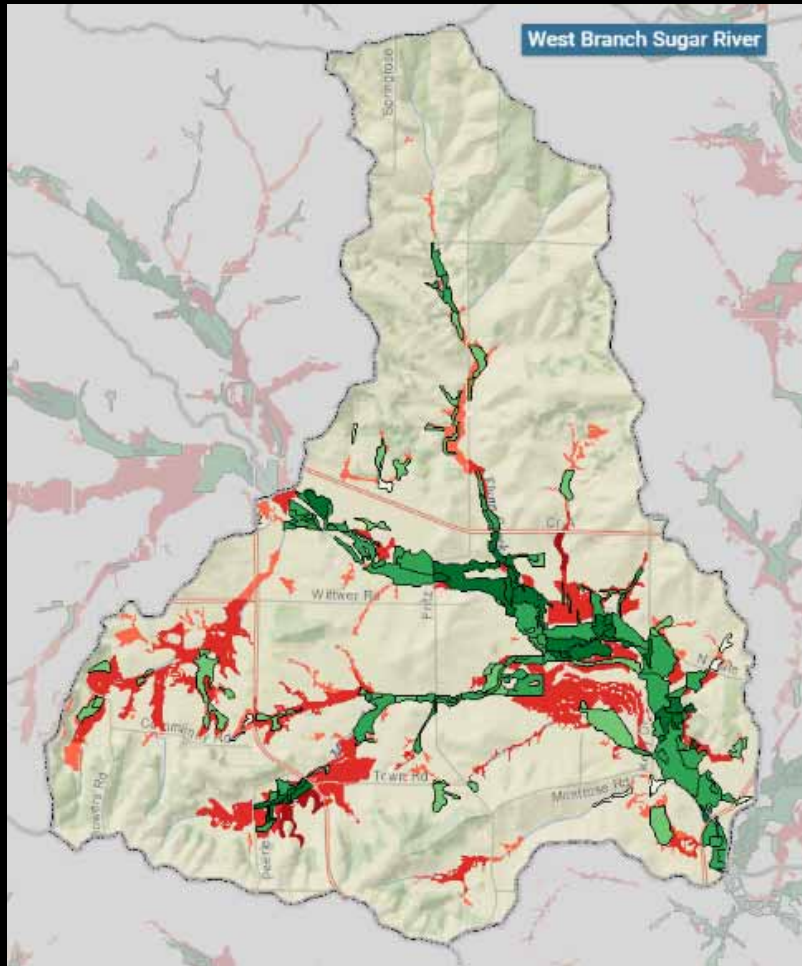
Wetlands by Design

A Watershed Approach for Wisconsin

Wetlands & Watersheds Explorer

www.WetlandsByDesign.org

Wetland Conservation Opportunities



Protection Opportunities
(current wetlands)

Restoration Opportunities
(former wetlands)



Methods: Watershed 'Needs'

Step 1

Wetland Map Data

- Wetland location/extent
- Wetland types
- Water regime
- etc.



Watershed Context Data

- Landscape Position
- Landform
- Waterbody type
- Waterflow path



Ecosystem Services

- Flood Abatement
- Fish & Aquatic Habitat
- Sediment Retention
- Nutrient Transformation
- Surface Water Supply

Methods: Watershed 'Needs'

Step 2

Historical
Service Provision



Current
Service Provision



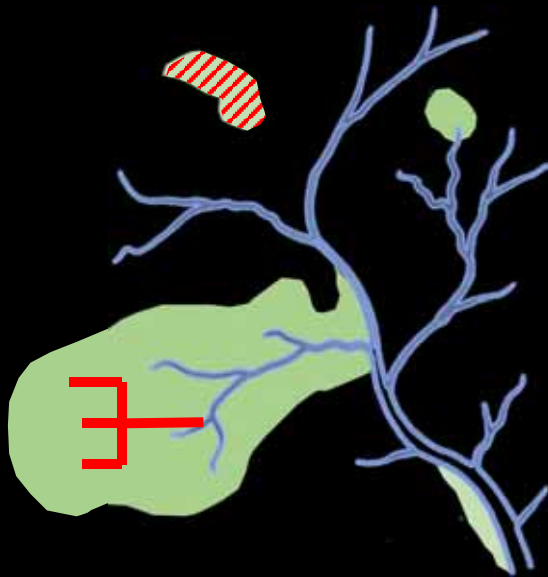
Watershed Service

Loss

Need

Opportunity

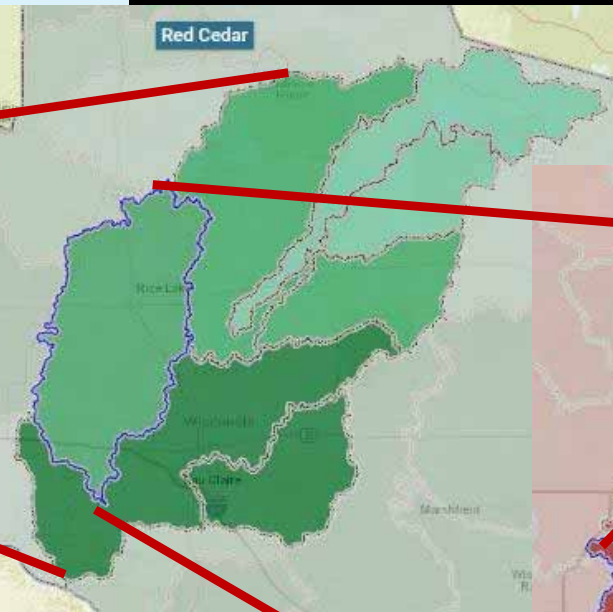
Historical Service Provision



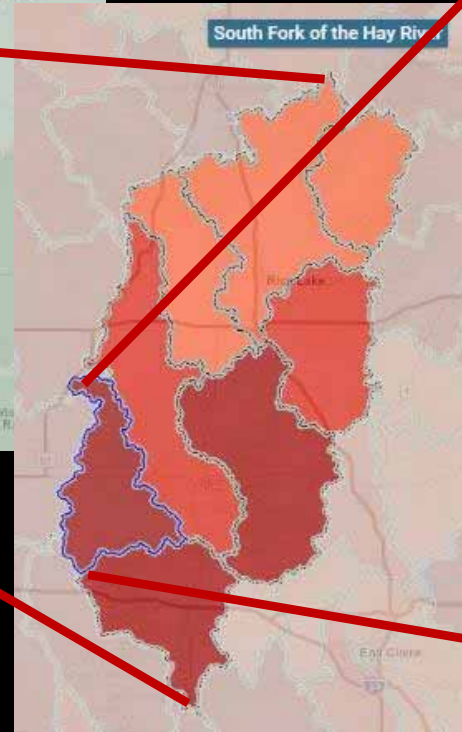
Results: Watershed Service Losses



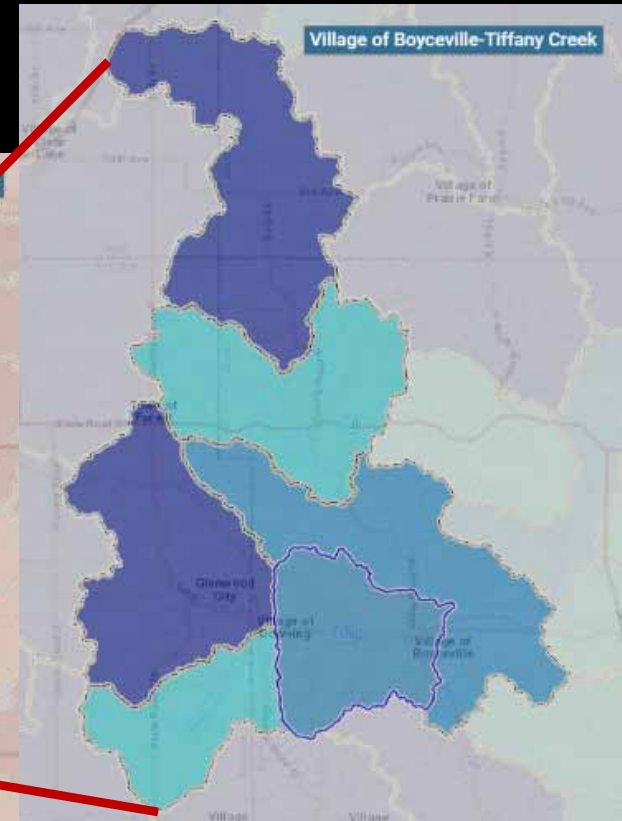
Chippewa River
6-digit HUC



Red Cedar River
8-digit HUC

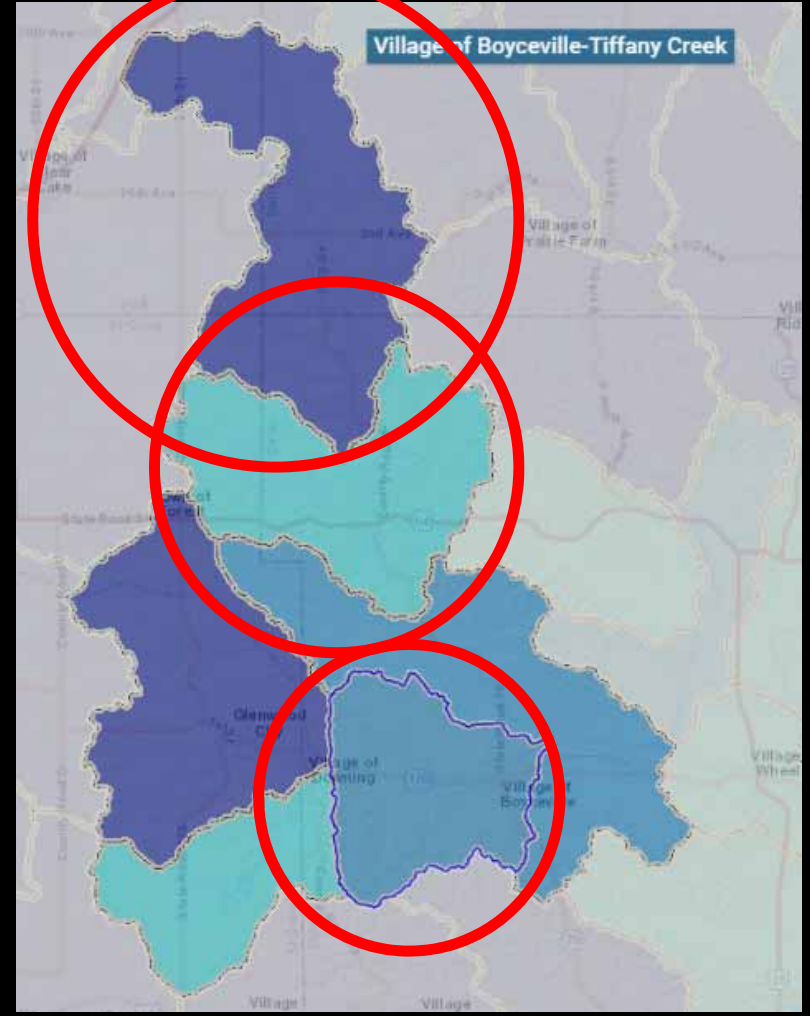
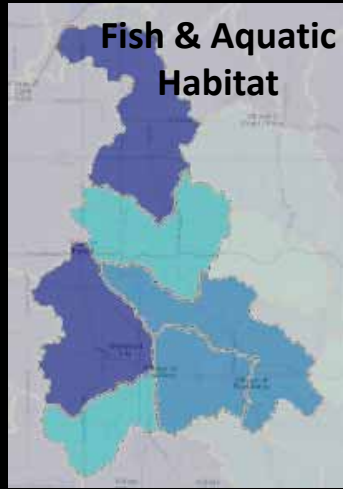


South Fork Hay River
10-digit HUC

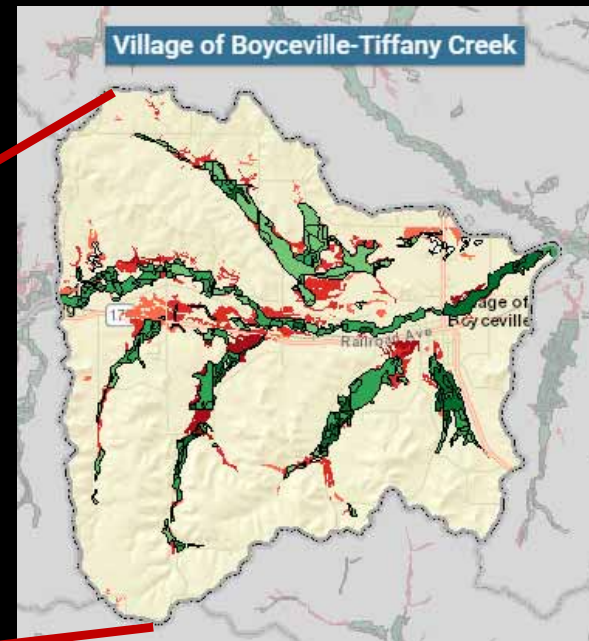
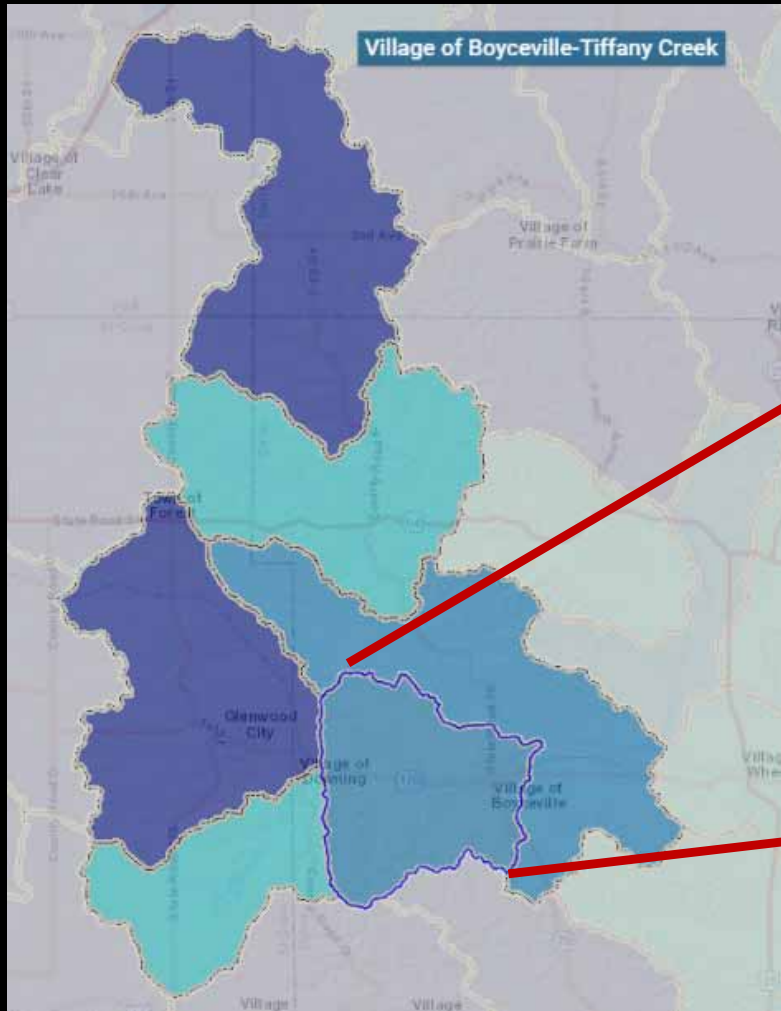


Tiffany Creek
12-digit HUC

Results: Watershed Service Losses

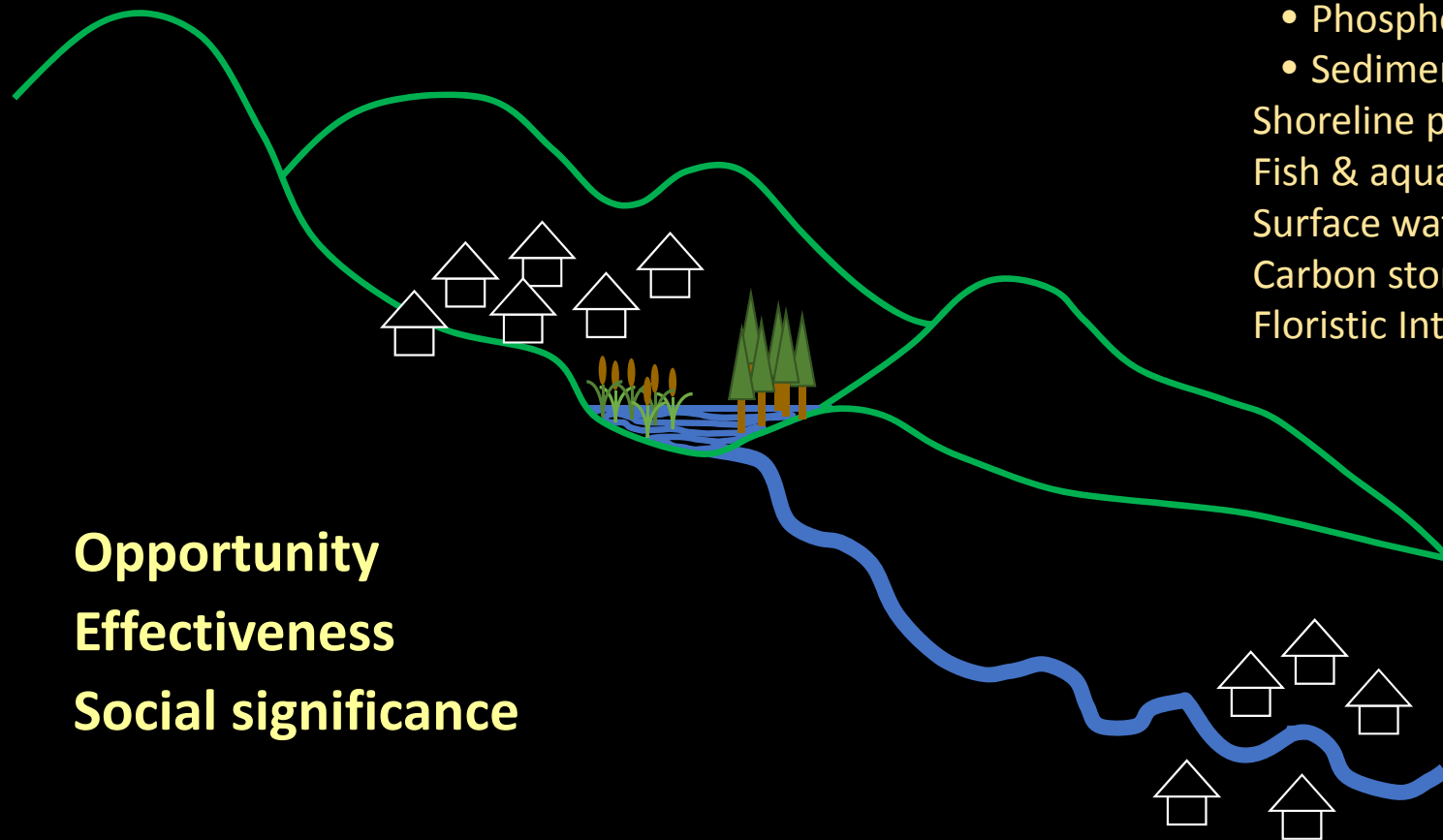


Methods: Site Ranks (Service Potential)

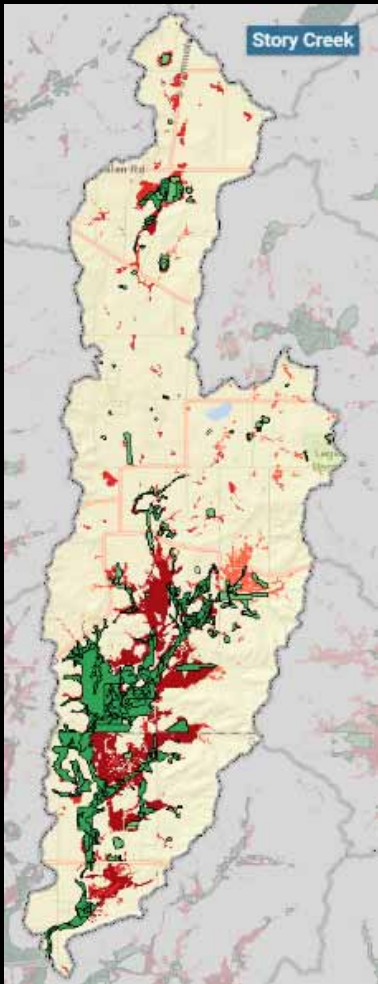


Prioritizing Wetland Conservation Opportunities

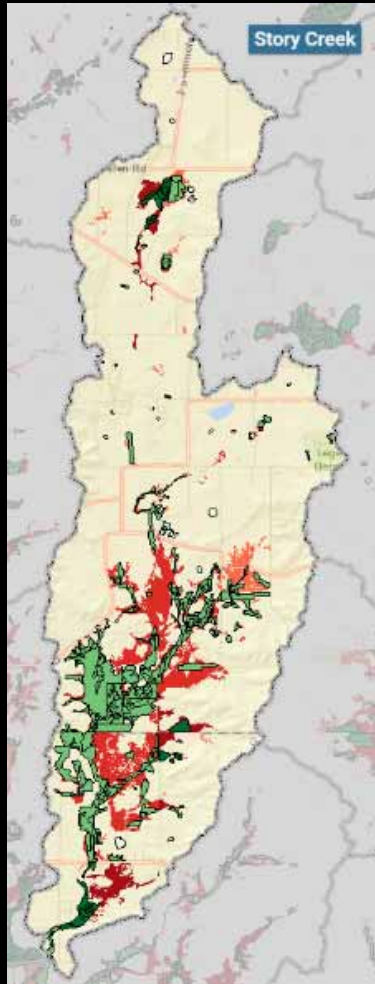
Example: Flood abatement



Wetlands as Natural Infrastructure



Nitrogen Reduction



Surface Water Supply



Phosphorus Reduction



Fish & Aquatic Habitat



Sediment Retention



Floristic Integrity



Flood Abatement



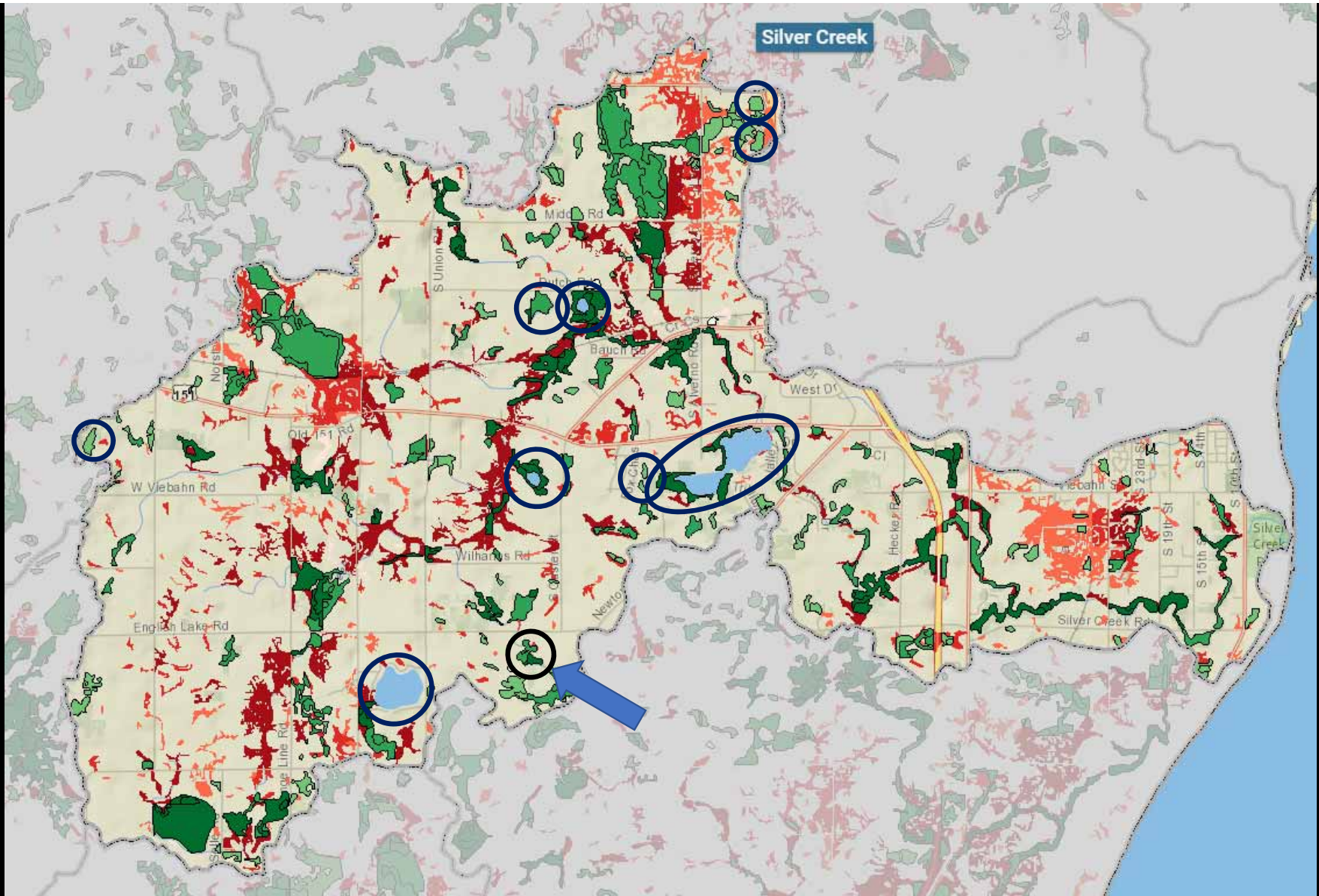
Shoreline Protection



Carbon Storage



Number of Services





Drohman Wetland

- Reduces flooding
- Keeps streams flowing
- Stores carbon
- Purifies water
- Wood Ducks!!!

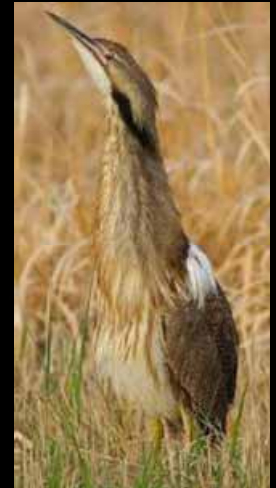


Wetland Wildlife Habitat

Forest Interior Guild



Shallow Marsh Guild



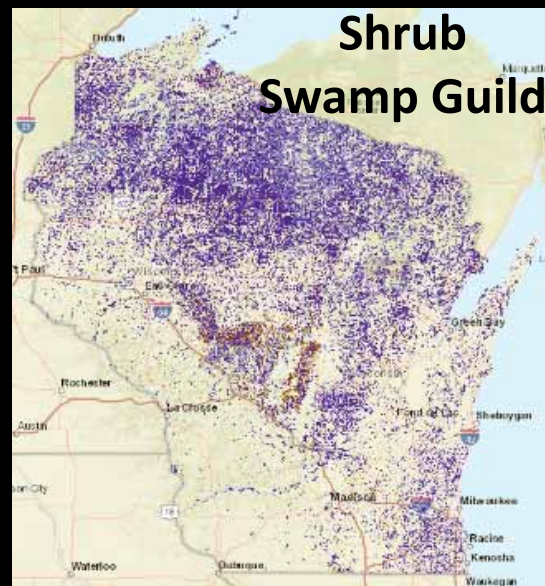
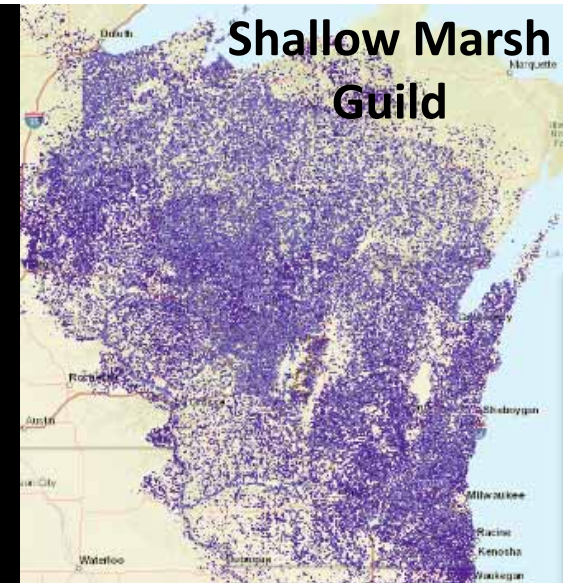
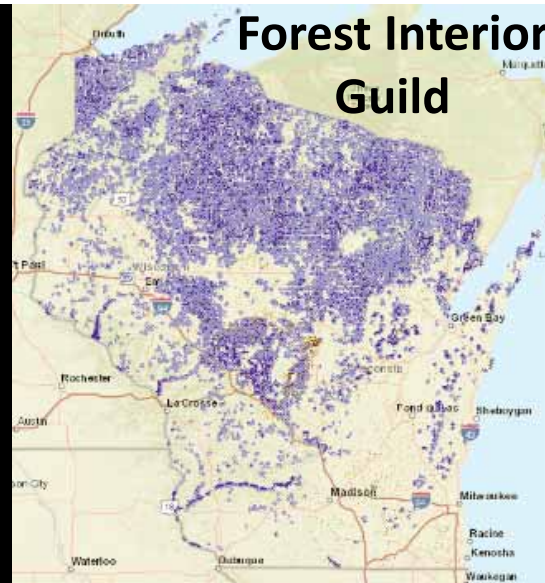
Open Waters Guild

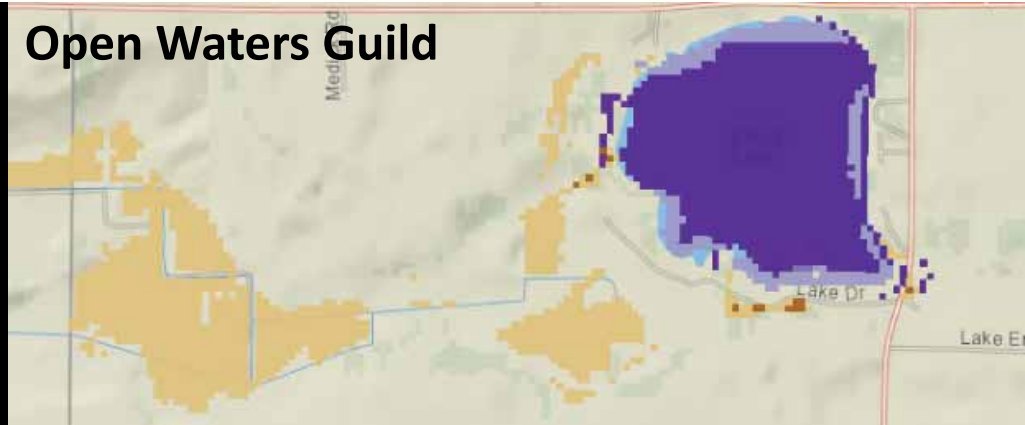
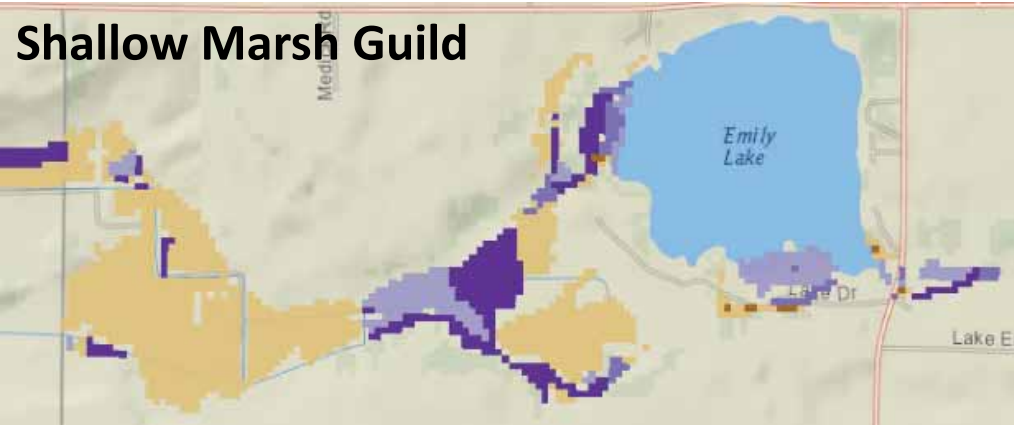


Shrub Swamp Guild



Wetland Wildlife Habitat



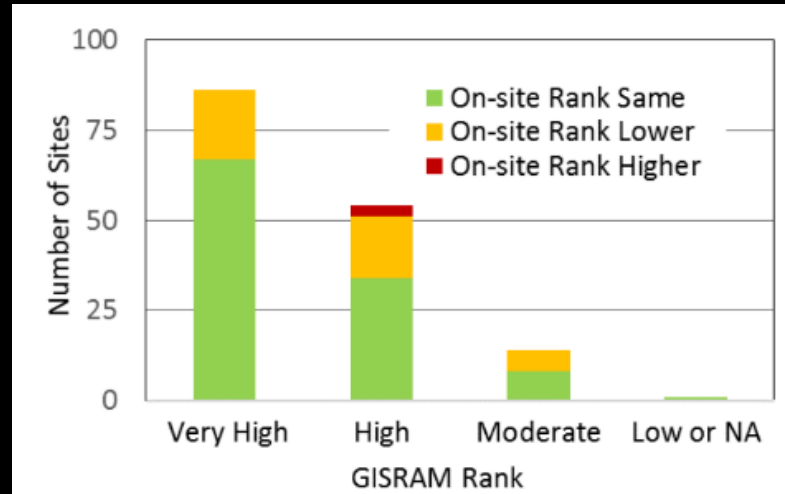
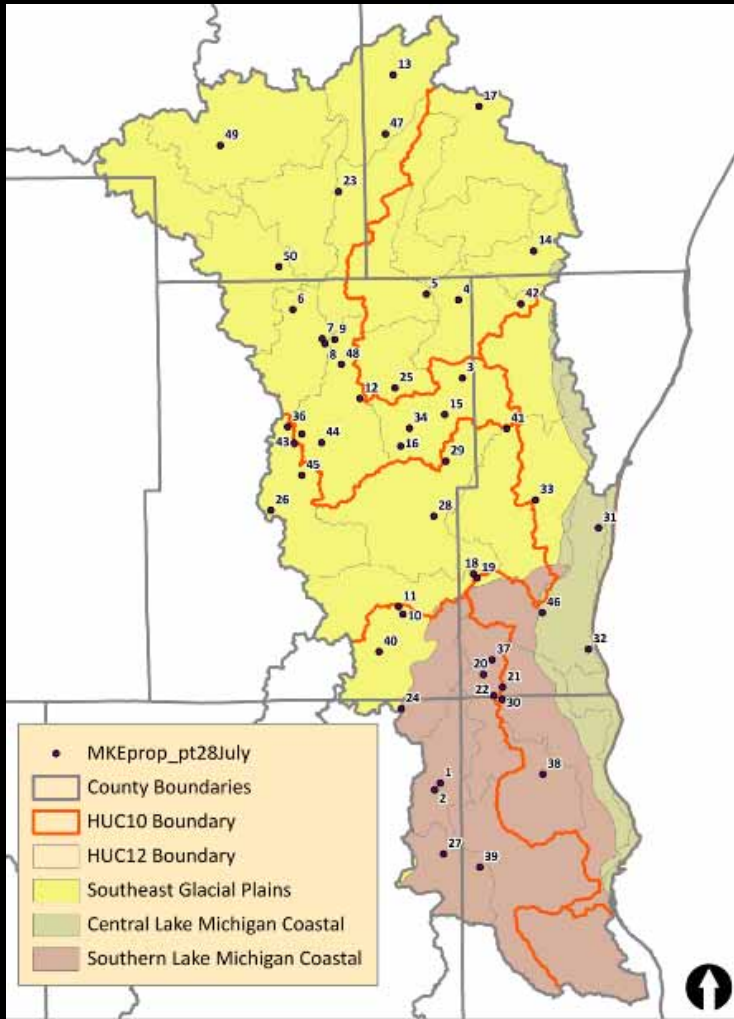


Wetland Wildlife

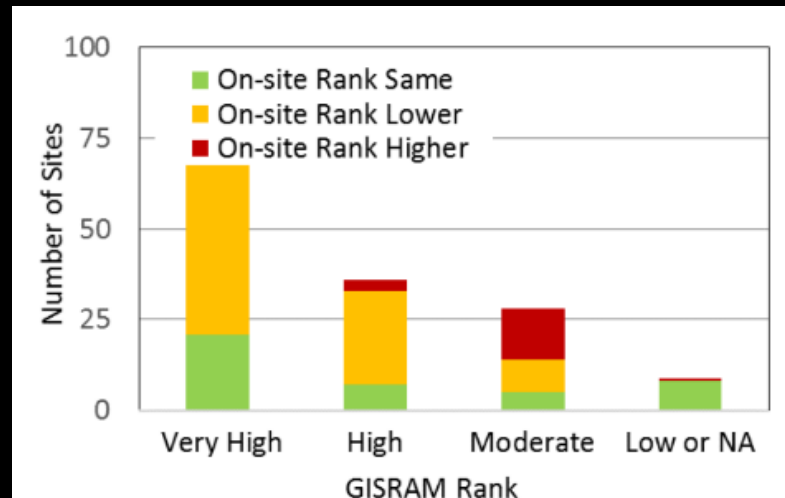
Emily Lake, Dodge County



Methods: Comparing WbD & Field Assessments for...



Flood Abatement



Floristic Quality

Who is this for?

Land Trusts
Local governments
Wetland Consultants
Planners (Counties, RPC's)
Nutrient Management Specialists
Mitigation regulators & project sponsors
Wildlife & Natural Resource Managers
Universities & Extensions
Watershed Planners
Private Businesses
Lake Associations

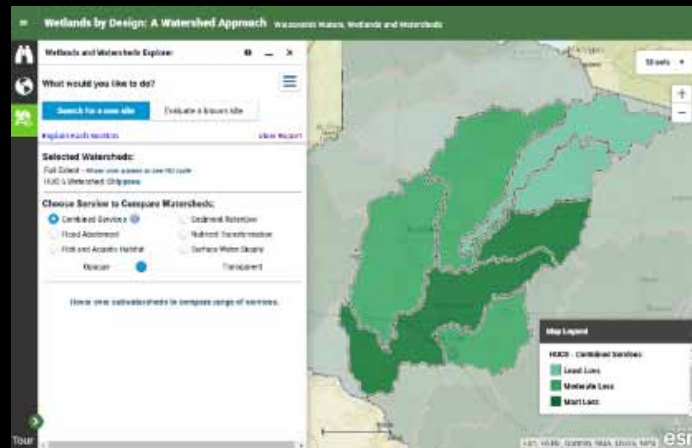
Potential Applications

Watershed plans
Grant proposals
Conservation planning
Outreach & education
Site selection, assessment, and design
Local & regional Comprehensive Plans
Nutrient trading & Adaptive Management
Siting natural infrastructure (e.g., for flood control)
Lake management plans (incl. shoreline protection)
Nutrient management planning
Wetland service valuation
Habitat improvement
Prioritizing projects
Research

www.WetlandsByDesign.org



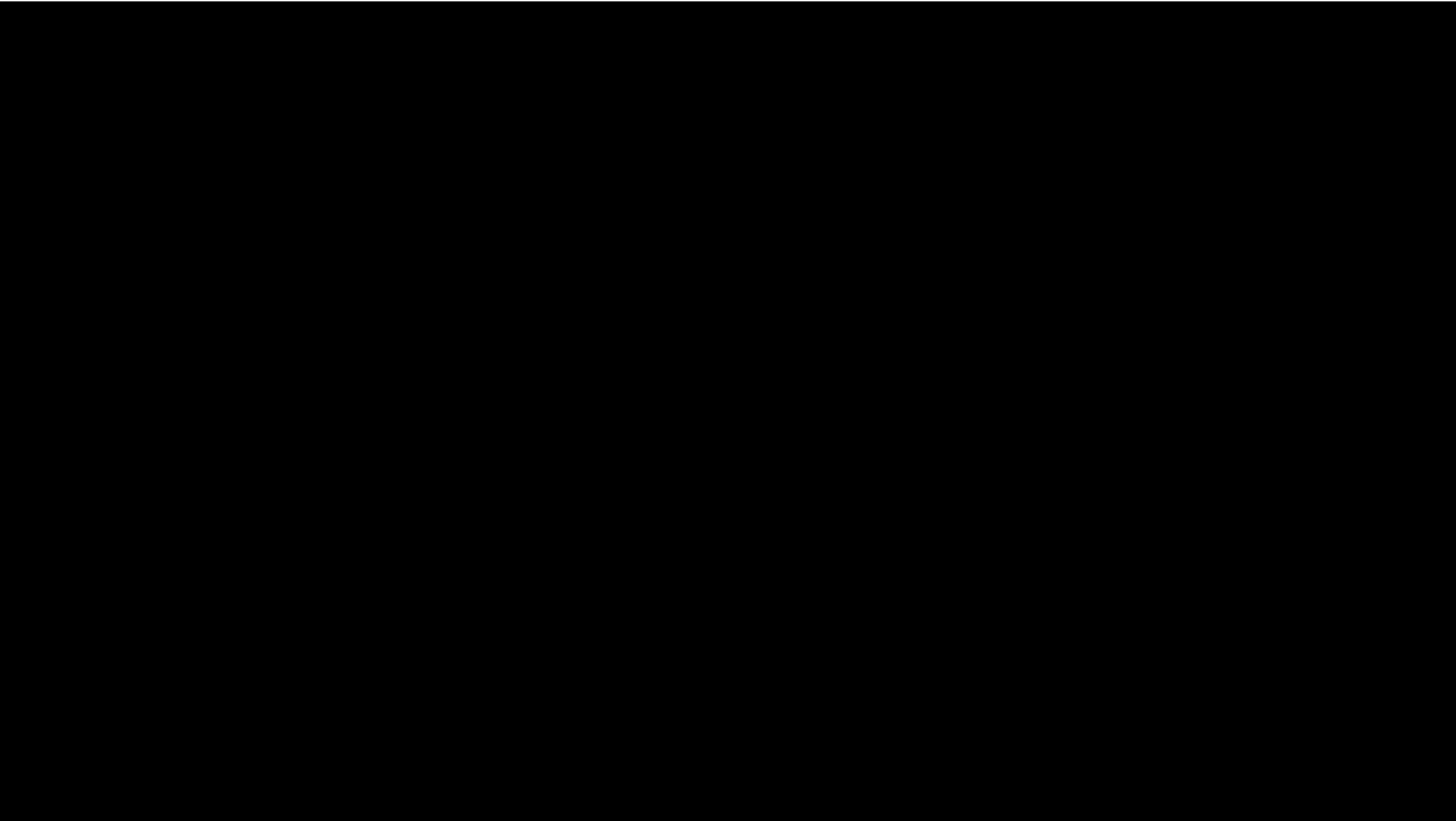
Report



Wetlands & Watersheds *Explorer*



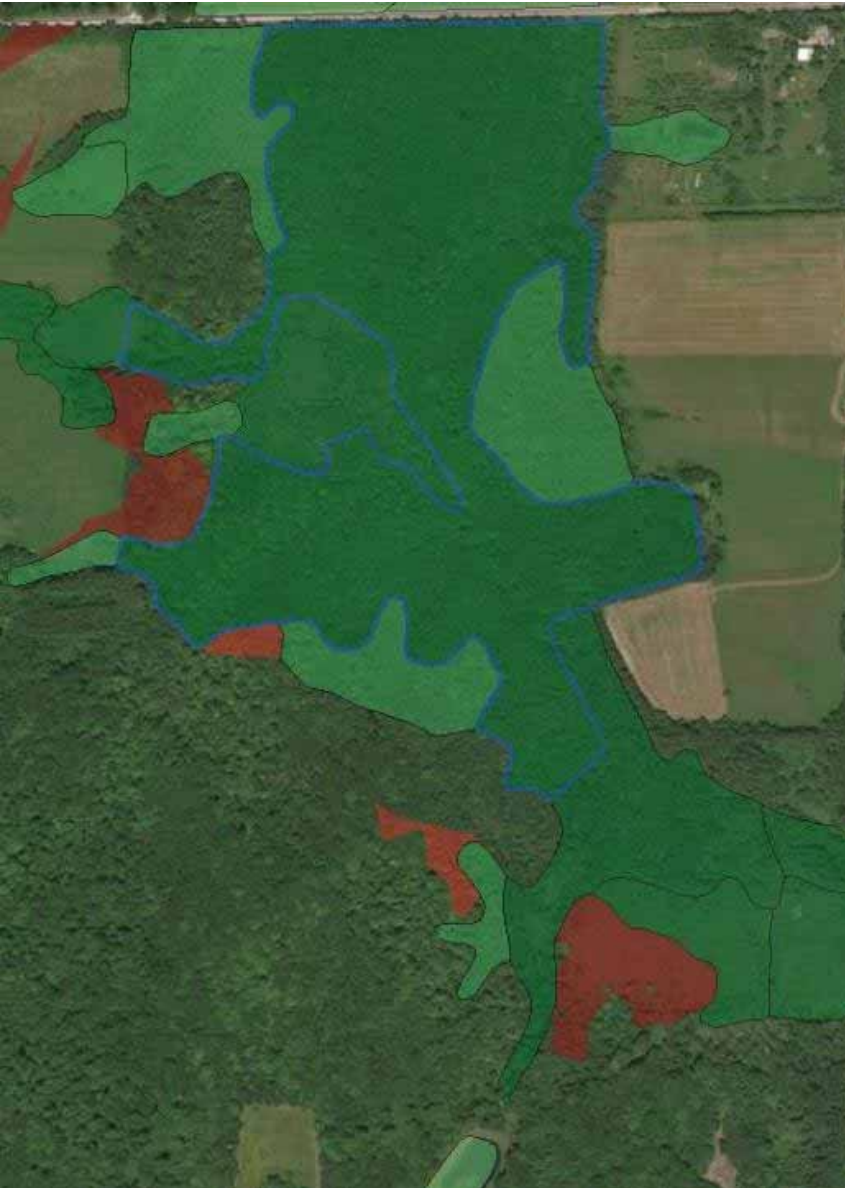
Webinar training





Flood Abatement: Site Example A

Code	O,E,S	Criterion	1=YES, 0=NO
FA_O1	O	Site is connected to a lake, stream, or river, OR receives concentrated inflow and/or outflow or is connected through an existing wetland to outflow.	1
FA_O2	O	Steep slopes in catchment	0
FA_O3	O	Runoff potential of catchment	0
FA_E2	E	Dominant vegetation of site is dense and persistent	1
FA_E3	E	Site is in a topographic depression or floodplain setting	1
FA_E4	E	Internal flow path distance within site	1
FA_E5	E	Ratio of catchment area to site area	1
FA_E9	E	Stream order associated with site connection	1
FA_S1	S	Site outflow contributes to downstream economically valuable flood-prone areas	0
		O-E Score (sum of O+E answered 'yes' / # of O+E questions)	0.75
		O-E-S Score (add +0.1 for each S answered 'yes')	0.75
		Size Factor (1, 1.5, 2)	2
		Site Score (O-E-S Score * Size Factor)	1.5
		GISRAM Rank (1 = Very High, Top Third within HUC12)	1 (Very High)
		WISRAM (Field) Rank	1 (Very High)



Flood Abatement: Site Example B

Code	O,E,S	Criterion	1=YES, 0=NO
FA_O1	O	Site is connected to a lake, stream, or river, OR receives concentrated inflow and/or outflow or is connected through an existing wetland to outflow.	1
FA_O2	O	Steep slopes in catchment	1
FA_O3	O	Runoff potential of catchment	0
FA_E2	E	Dominant vegetation of site is dense and persistent	1
FA_E3	E	Site is in a topographic depression or floodplain setting	1
FA_E4	E	Internal flow path distance within site	1
FA_E5	E	Ratio of catchment area to site area	1
FA_E9	E	Stream order associated with site connection	0
FA_S1	S	Site outflow contributes to downstream economically valuable flood-prone areas	1
O-E Score (sum of O+E answered 'yes' / # of O+E questions)			0.75
O-E-S Score (add +0.1 for each S answered 'yes')			0.85
Size Factor (1, 1.5, 2)			2
Site Score (Raw Score * Size Factor)			1.7
GISRAM Rank (1 = Very High, Top Third within HUC12)			1 (Very High)
WISRAM (Field) Rank			2 (High)



Floristic Integrity: Site Example C

Code	O,E,S	Criterion	1=YES, 0=NO
FQ_O1	O	Site is vegetated	1
FQ_O2	O	Site does not have documented invasives	0
FQ_O3	O	Site receives groundwater discharge	0
FQ_O4	O	Catchment is largely composed of natural cover	0
FQ_O5	O	Site not within invasives dispersal zone	0
FQ_O7	O	Site recognized as high quality plant community	0
FQ_E1	E	Site buffer is composed of natural land cover	0
O-E Score (sum of O+E answered 'yes' / # of O+E questions)			0.14
O-E-S Score (add +0.1 for each S answered 'yes')			NA (0.14)
Size Factor (1, 1.5, 2)			NA
Site Score (Raw Score * Size Factor)			0.14
GISRAM Rank (3 = Moderate, Bottom 1/3 in HUC12)			3 (Moderate)
WISRAM (Field) Rank			1 (Very High)

Wildlife Tool Matrix

Guilds

Open Water
Shallow Marsh
Shrub Swamp
Forest Interior

Landcovers

Wetland types
Upland types
Open waters

'Proximity' (Landscape) Factors

Land Cover Types		Wetland Wildlife Habitat Guilds			
		Open Water	Shallow Marsh	Shrub Swamp	Forest Interior
UPLAND	Urban/Developed, high intensity	0	0	0	0
	Urban/Developed, low intensity	0	0	0	0
	Grasslands and Pasture	0	2*	0	0
	Forest, evergreen	0	0	0	1*
	Forest, deciduous	0	0	0	1*
	Forest, mixed	0	0	0	1*
	Shrub Land (<u>not</u> shrub-carr)	0	0	0	0
	Cultivated Land	0	0	0	0
LARGE OPEN WATER	Surface Water, rivers	0	1	0	0
	Surface Water, lakes	3	1	0	0
WETLAND	Open Water Wetlands	1*	3	0	0
	Aquatic Bed/Deep Marsh	3	3	0	0
	Shallow Marsh <= 5 acres	2*	3	0	0
	Shallow Marsh > 5 acres	3*	3	0	0
	Wetland Meadows	1*	3	2*	0
	Wetland Forest, broad leaved	0	2*	0	3#*
	Wetland Forest, coniferous	0	2*	0	3#*
	Wetland Forest, mixed	0	2*	0	3#
	Shrub Bog, evergreen	0	0	2*	0
	Shrub-carr, deciduous	0	2*	3	2#*
	Cultivated flat	0	0	0	0
Natural flats	0	0	0	0	
SPECIAL TYPES	Reed canarygrass	0	1	0	0
	Cattail	2*	3	0	0
	Road corridor	1	1	1	1

Guild	Primary Habitat Selection	Additional Primary Habitat (#) for Forest Interior Guild	Ancillary Habitat (*) Selection
Open Water	Combine all rank 3 land cover types.		Selected Rank 1* and 2* cover within 100 m of primary habitat is added.
Shallow Marsh	Combine all rank 3 land cover types.		Selected Rank 2* cover within 100 m of primary habitat is added.
Shrub Swamp	Combine all rank 3 land cover types.		Selected Rank 2* cover within 100 m of primary habitat is added.
Forest Interior	Combine all rank 3 land cover types. Combined patches must be >75 ha.	Patches of rank 2 and 3 cover types less than 75 ha if forest cover within 1 km of the patch is greater than 50%.	Selected Rank 1* and 2* cover within 100 m of primary habitat is added.

