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NRCS Wetland Easement Monitoring and Wetland Quality Evaluation

Final Report

Period: 1 January 2015 – 31 December 2015

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Introduction

During 2015, the Illinois Natural History Survey (INHS) conducted wetland easement monitoring and wetland quality evaluations for the Natural Resources Conservation Service (NRCS). In total, 106 wetland easements were monitored within a 28 county area across central Illinois, including 4 Emergency Watershed Protection Program-Floodplain Easements (EWPP-FPE), 14 Emergency Wetland Reserve Program (EWRP) easements, and 88 Wetland Reserve Program (WRP) easements. We acknowledge that wetland easements have recently been re-classified as wetland reserve easements (WRE) within the Agriculture Conservation and Easement Program, but herein we have retained the former nomenclature to maintain consistency with existing management plans and agency documents.

Our goal was to visit at least 100 wetland easements in Illinois during 2015, meet with or contact landowners to verify ownership information, identify potential land uses or practices incompatible with program objectives and active authorized practices, and assess general habitat quality for wetland birds. Specifically, we completed an annual monitoring worksheet, conducted a rapid wetland assessment to estimate habitat quality for wetland birds, and provided general information regarding condition of easements.

Methods

We visited 106 easements during 5 May 2015 – 30 October 2015. Site visits were divided approximately equally among three seasons corresponding to important periods for wetland birds: 1) spring (breeding habitat for waterfowl and marsh birds), 2) summer (migration habitat for shorebirds), and 3) fall (migration habitat for waterfowl and other wetland-associated birds). Spring surveys were conducted during May and June, summer surveys during August and September, and fall surveys during October. During 2015, 20 easements were visited during spring, 50 during summer, and 36 during fall. Due to extensive flooding along rivers and other waterways during late spring, a number of sites were moved to the summer and fall sampling periods that were originally scheduled for the spring sampling period.

Easement Level Metrics

We identified the percentage of each easement composed of various cover types, including forest, scrub-shrub, row crop, fallow field, upland grass and forbs (prairie), food plot, and inundated, which included any land that had standing water at the time of the survey (Table 1). Our estimates of vegetation cover could exceed 100%, since an inundated area could simultaneously contain multiple cover types. For example, an area could contain both a forested overstory and scrub-shrub vegetation in the understory. In addition to cover type classification and mapping, we ranked easements on an 8-point scale for three different metrics: intensity of waterfowl management, wetland habitat complexity, and wetland connectivity to rivers and streams. Higher scores indicate more intense management practices to benefit waterfowl, increased wetland complexity to maximize diversity of flora and fauna, or increased connectivity to rivers or streams to increase nutrient and sediment capture and flood attenuation (Appendix 1). In addition to easement-wide metrics, we evaluated the discrete inundated area within each easement for various metrics, including cover types, water sources, wetland stressors, and others as flooded area provides the primary habitat for many wetland-dependent wildlife species. Each inundated area was classified according to Cowardin et al. (1979). Estimates are expressed as means with associated standard errors.

Results and Discussion

Overall, forest accounted for approximately 31.4 ± 3.2% of cover on easements, followed by upland grasses and forbs (19.4 ± 2.4%) and scrub-shrub (17.2 ± 1.9%) vegetation. Food plots

(0.6 ± 0.2%), row crops (0.5 ± 0.3%), and fallow fields (0.5 ± 0.4%), comprised a small portion of surveyed easements (Table 2).

Overall, the average proportion of an easement containing surface water was 28.2 ± 3.5%. Approximately 22% (23 of 106) of all easements had no standing water at the time they were surveyed. Inundated habitat made up approximately 30.6 ± 6.1% of the land in the easements surveyed during spring, 37.2 ± 6.1% of the land surveyed during summer, and 14.6 ± 3.8% of the land surveyed during fall. The increased amount of inundated land during the summer was likely the result of extensive flooding across central portions of Illinois during July. Unfortunately, only a small portion of easements surveyed during fall, an important time period for migrating waterfowl and other waterbirds, had surface water to make them usable as stopover habitat.

On average, easements ranked low for each overall metric, with waterfowl management intensity achieving a score of 1.92 ± 0.17, wetland habitat complexity receiving a score of 2.58 ± 0.2, and wetland connectivity to rivers and streams achieving a score of 2.34 ± 0.18. In comparison, managed wetlands surveyed during a concurrent marsh bird monitoring project in Illinois received scores of 4.63 ± 0.32 for waterfowl management intensity, 5.03 ± 0.17 for wetland habitat complexity, and 2.63 ± 0.34 for wetland connectivity to rivers and streams. On average, managed wetlands scored higher in all three categories when compared to NRCS wetland easements. We suspect that, although river connectivity scores are similar between managed wetlands and WRP wetlands, the connectivity in managed wetlands is better controlled through the use of levees and water control structures and resulted in better habitat for waterfowl and increased wetland complexity for biodiversity.

Of all inundated areas surveyed, 70% of the 135 discrete areas observed were classified as unconsolidated bottom, 16% as emergent, 12% as aquatic bed, 1.5% as forested, and 0.7% as scrub-shrub, according to Cowardin et al. (1979). Primary water sources appeared to be precipitation/snow melt (2.08 ± 0.08 on a 3 point scale), with overbank flooding being the second-most influential source of water (1.02 ± 0.1 on a 3-point scale). Furthermore, of all the wetland areas surveyed, 31.9 ± 4.0% of the total wetland area, on average, was actively managed in some way, including both vegetation and water manipulation.

When examining community composition within inundated portions of easements, open water habitat composed about 69.9 ± 3.2% of the inundated area, while moist-soil vegetation made up approximately 11.7 ± 1.9%. Submersed/floating leaf aquatic vegetation accounted for 8.2 ± 1.9% of the inundated area, while scrub-shrub (3.5 ± 0.8%) and forested (2.8 ± 1%) habitats were the smallest contributors (Table 3).

Community composition among the seasons was relatively consistent (Table 4). Submersed aquatic vegetation cover decreased and open water habitat increased during the fall period, which could have been caused by vegetation senescence and drawdowns. Moreover, pumping of water into impoundments in preparation for the waterfowl hunting season could have inundated moist-soil vegetation in the fall which was dry earlier in the year, which is a normal wetland management practice.

Feedback from Landowners

While conducting these wetland evaluations, we would often speak with landowners about their property, including current management practices and schedules, future management goals and objectives, and their experiences with the easement program in which they were enrolled. Many landowners expressed a desire for a closer connection among the state office, county office, and the landowners themselves. Many landowners noted a lack of interactions with NRCS regarding their easement since it had been enrolled in the program and the restoration activities had been completed. Also, several landowners felt the restoration had been done incorrectly, and they were upset that the situation was not evaluated and rectified. In general, landowners wished there were more funds allocated for management and maintenance activities on currently enrolled easements.

Landowners and INHS biologists noted that many of these easements consisted of bottomland property adjacent to rivers and streams that commonly flooded. While overbank flooding provides benefits of sediment capture, nutrient removal, and flood attenuation, waterbird habitat is generally degraded and infrastructure for water management capabilities can be destroyed or disabled (Havera 1999, Opperman et al. 2009, Sparks 1995). In addition, many easements were restored by planting hardwood, mast-producing trees in these bottomland areas affected by overbank flooding. However, with little to no active management and frequent flooding of these areas, these hardwood trees were replaced by cottonwoods and sycamores through natural adaptations and ecological succession (King 1995, King and Allen 1996). We noted many bottomland areas where few or no mast-producing hardwood trees had survived following the restoration phase and suggest that future restoration practices include the low survival probability in low-lying areas or implement management practices to reduce competition with less desirable species. Generally, INHS biologists and landowners noted that planting of hardwood trees was a failed restoration practice on easements visited in 2015.

Notable Violations and Other Issues

There were few potential violations noted on the easements surveyed during 2015, but a few were of special note. Two of the easements had oil/natural gas pipelines through the property. One easement contained active construction (Figures 2–3), and another easement was visited after a pipe was buried underground (Figure 4-5). Several easements had water control structures that had been damaged or made inoperable, either intentionally or naturally (Figures 6, 8, 18–22). Finally, dumping of garbage seemed to be the most common violation, whether intentionally by the landowner or by others trespassing on the property. One easement in particular had river access, so it appeared to be frequented by boaters during the summer months and contained extensive amounts of garbage (Figures 9–14). We note that it would probably be impractical to police this easement due to the nature of remote access.

Conclusions

In conclusion, the monitoring activities completed in 2015 seemed to receive a positive reaction from most landowners and were important to update landowner contact information (87% of easements), establish links between state and county offices, and prevent major violations. Site visits in 2015 were an important start to evaluating the quality of wetlands on all NRCS wetland easements within Illinois, but at least 3 additional years would be needed to complete monitoring across all easements in the state. Monitoring of all easements within Illinois within a 5-year rotation would give state and local NRCS officials a firm grasp on the functioning of the wetland easement programs within the state and the quality of wetlands on those easements (Collins 2008, Mack 2001). We suggest continued monitoring in future years.

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Table 1. Definitions used for determining habitat coverage on wetland easements surveyed during 2015.

Habitat Type	**Description**
Forest	Woody vegetation greater than or equal to 6 meters in height.
Inundated	Surface water present.
Prairie	Grasses and forbs generally adapted to upland conditions.
Scrub-Shrub	Woody vegetation less than 6 meters in height.
Food Plot	Area planted for the purpose of luring, attracting, and/or feeding wildlife. Can be found in upland or wetland areas. Does not include row crops.
Row Crop	Areas planted for the purpose of harvesting a crop for income.
Fallow Field	Old fields, usually not managed in any way. Also includes hay fields.

Table 2. Average percent cover (± standard error) of each cover type on overall NRCS wetland easements that were monitored during 2015.

Cover Type	Percent Cover
Forest	31.4 ± 3.2
Inundated	28.2 ± 3.5
Prairie	19.4 ± 2.4
Scrub-Shrub	17.2 ± 1.9
Food Plot	0.6 ± 0.2
Row Crop	0.5 ± 0.3
Fallow Field	0.5 ± 0.4

Table 3. Average percent cover (± standard error) of various cover types examined within inundated areas of wetland easements during 2015.

Cover Type	Percent Cover
Open Water	69.9 ± 3.2
Moist-soil Vegetation	11.7 ± 1.9
Submersed/Floating Leaf Vegetation	8.2 ± 1.9
Scrub-Shrub	3.5 ± 0.8
Forest	2.8 ± 1

Table 4. Average percent cover (± standard error) of various cover types within inundated areas of wetland easements during each sampling period in 2015.

Cover Type	Survey Period		
	Spring	Summer	Fall
Open Water	68.3 ± 7.5	69.2 ± 5.9	75.5 ± 5.2
Moist-soil Vegetation	17.6 ± 5.6	8.3 ± 3.0	11.5 ± 3.5
Submersed/Floating Leaf Vegetation	9.0 ± 4.3	11.5 ± 3.9	3.4 ± 2.6
Scrub-Shrub	4.2 ± 1.4	3.2 ± 1.2	3.3 ± 2.1
Forest	1.4 ± 1.0	3.7 ± 2.3	2.6 ± 1.4

Figure 1. Map of Illinois showing the locations of easements which were surveyed in 2015.

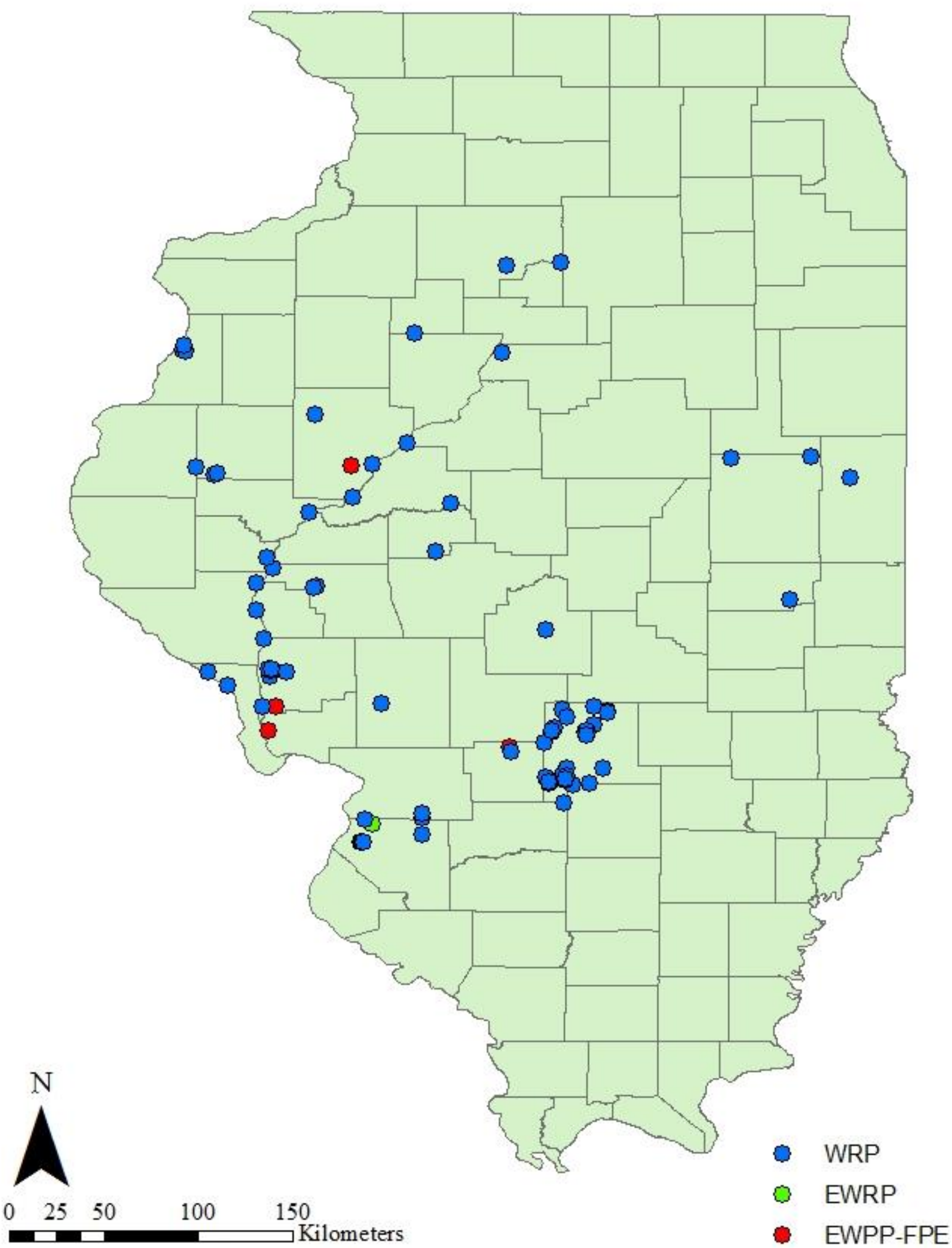

Figure 2. Oil/gas pipeline being constructed through an easement in Fayette County, with accompanying road for equipment access.

Figure 3. Oil/gas pipeline being constructed through an easement in Fayette County.

Figure 4. Cleared area where an oil/gas pipeline had been buried underground through an easement in Fayette County. Picture is looking north through the easement.

Figure 5. Cleared area where an oil/gas pipeline had been buried underground through an easement in Fayette County. Picture is looking south through the easement.

Figure 6. Broken water control structure on an easement in Greene County.

Figure 7. Exposed drain pipe due to soil erosion on an easement in Greene County.

Figure 8. Water control structure filled with sediment on an easement in Christian County.

Figure 9. Grill, chairs, and other associated garbage on an easement along the Illinois River in Bureau County.

Figure 10. Garbage on an easement along the Illinois River in Bureau County.

Figure 11. Garbage, as well as a homemade toilet, on an easement along the Illinois River in Bureau County.

Figure 12. Picnic tables and garbage on an easement along the Illinois River in Bureau County.

Figure 13. Garbage on an easement along the Illinois River in Bureau County.

Figure 14. Garbage on an easement along the Illinois River in Bureau County.

Figure 15. Reduced water clarity and matted down vegetation on an easement in Fayette County. These conditions resulted from flooding from a nearby creek onto the easement. Sedimentation has resulted in the water control structure becoming inoperable.

Figure 16. *Phragmites sp.* growing on an easement in St. Clair County.

Figure 17. Some easements are in urbanized areas, such as this easement along I-55 in St. Clair County.

Figure 18. Screw gate that has been made inoperable near an easement in Madison County.

Figure 19. Screw gate that has been made inoperable near an easement in Madison County.

Figure 20. Screw gate that has been made inoperable on an easement in Madison County.

Figure 21. Water control structure that has not been maintained on an easement in Greene County.

Figure 22. Water control structure that has become inoperable due to sedimentation on an easement in Calhoun County.

APPENDIX 1. Data forms.

Overall Easement Characteristics Sheet1

Grid# or Survey Site ID: ________________________ # Survey Points: ______________

Evaluator(s): ________________________ Date: ____/____/______

Site Owner: ____

Permission by: ________________________ Date: ______________

Complete one form for each easement.

General Easement Description:

General Management Practices and Intensity:

Intensity of Waterfowl Management Activities: (None) ○1 ○2 ○3 ○4 ○5 ○6 ○7 ○8 (Extensive)

Wetland Habitat Complexity: (Low) ○1 ○2 ○3 ○4 ○5 ○6 ○7 ○8 (High)

Wetland Connectivity to Rivers or Streams: (Low) ○1 ○2 ○3 ○4 ○5 ○6 ○7 ○8 (High)

Forested ________% Prairie ____________%

Scrub-Shrub ________% Food Plot ____________%

Row Crop ________% Wetland ____________%

Hay Field ________%

Duck Hunting? ______ Dabblers: ____________

Deer Hunting? ______ Divers: ____________

Other Recreational Use? Shorebirds: ____________

______________ Other Waterbirds: ____________

Hydrologic and Vegetation Influences Within or Adjacent to Easement

Pollution / industrial discharges	○ NP ○ 1 ○ 2 ○ 3	Pumps - Out for irrigation	○ NP ○ 1 ○ 2 ○ 3
Railroad Bed	○ NP ○ 1 ○ 2 ○ 3	Dams, Dikes, Levees	○ NP ○ 1 ○ 2 ○ 3
Roads	○ NP ○ 1 ○ 2 ○ 3	Field Tilling	○ NP ○ 1 ○ 2 ○ 3
Ditches, drains, channels	○ NP ○ 1 ○ 2 ○ 3	Excavation / Dredging	○ NP ○ 1 ○ 2 ○ 3
Forest cutting / clearing	○ NP ○ 1 ○ 2 ○ 3	Industrial uses	○ NP ○ 1 ○ 2 ○ 3
Water turbidity	○ NP ○ 1 ○ 2 ○ 3	Culverts	○ NP ○ 1 ○ 2 ○ 3
Upland plant species in wetland	○ NP ○ 1 ○ 2 ○ 3	Concrete / Asphalt cover	○ NP ○ 1 ○ 2 ○ 3
Dead trees	○ NP ○ 1 ○ 2 ○ 3	Sediment Deposition	○ NP ○ 1 ○ 2 ○ 3
Stormwater inputs (direct)	○ NP ○ 1 ○ 2 ○ 3	Algae mats	○ NP ○ 1 ○ 2 ○ 3
Burning	○ NP ○ 1 ○ 2 ○ 3	Grazing by domestic animals	○ NP ○ 1 ○ 2 ○ 3
Deep ponds / irrigation pits	○ NP ○ 1 ○ 2 ○ 3	Disking or farming (food plots)	○ NP ○ 1 ○ 2 ○ 3
Insect/Disease veg. damage	○ NP ○ 1 ○ 2 ○ 3	Dumping of garbage, etc.	○ NP ○ 1 ○ 2 ○ 3
Soil scouring, erosion	○ NP ○ 1 ○ 2 ○ 3	Haying, ext. plant removal	○ NP ○ 1 ○ 2 ○ 3
Invasive species	○ NP ○ 1 ○ 2 ○ 3	Utility lines or corridors	○ NP ○ 1 ○ 2 ○ 3
Oil/has wells or infrastructure	○ NP ○ 1 ○ 2 ○ 3	Maintained trails	○ NP ○ 1 ○ 2 ○ 3
Duck blinds	○ NP ○ 1 ○ 2 ○ 3	Herbicide applications	○ NP ○ 1 ○ 2 ○ 3
Housing/urban development	○ NP ○ 1 ○ 2 ○ 3	Recreational motor boating	○ NP ○ 1 ○ 2 ○ 3

Wetland Habitat Characteristics Sheet 2

Site:________________ Survey Point:______________ Evaluator(s):__________ Date:____/____/_______

Complete one form for each wetland polygon within each grid or marsh bird survey point within each site.

Cowardin Classification Levels

Palustrine (P): shallow marsh (<2m), typically vegetated, small non-vegetated lakes or ponds (<8ha)

Lacustrine (L): lakes >8ha, deepwater marsh (>2m) <30% vegetation, topographic depression or dammed river channel

Limnetic (1): deep (>2m), Littoral (2): shallow (<2m)

Riverine (R): Area river or stream channel banks or levees, <30% emergent vegetation, flowing water

Tidal(1) Lower Perrenial(2): slow moving Upper Perrenial(3): fast moving Intermittant(4)

Class / Subclass (Pick 1 set; use 30% vegetation dominance rule)

1. Rock Bottom (RB)
- a. Bedrock
- b. Rubble

2. Unconsolidated Bottom
- a. Cobble-gravel
- b. Sand
- c. Mud
- d. Organic

3. Aquatic Bed (AB)
- a. Algal
- b. Aquatic Moss
- c. Rooted vascular
- d. Floating vascular

4. Unconsolidated Shore
- a. Cobble-gravel
- b. Sand
- c. Mud
- d. Organic
- e. Vegetated

5. Rocky Shore (RS)
- a. Bedrock
- b. Rubble

6. Moss Lichen (ML)
- a. Moss
- b. Lichen

7. Emergent (EM)
- a. Persistent
- b. Nonpersistent

8. Scrub-Shrub (SS)
- a. broad-leaved deciduous
- b. needle-leaved deciduous
- c. broad-leaved evergreen
- d. needle-leaved evergreen
- e. dead

9. Forested (FO)
- a. broad-leaved deciduous
- b. needle-leaved deciduous
- c. broad-leaved evergreen
- d. needle-leaved evergreen
- e. dead

Water Modifiers
- A. temporary
- B. saturated soil
- C. seasonal
- D. semipermanent
- E. permenent
- F.

Special Modifiers
- G. artificial
- H. beaver
- I. drained-ditch
- J. farmed
- K. impounded
- L. spoil
- M. excavated
- N. flooded upland

Classification:_______________________ Notes:____________________________________

Mean water depth in Point / Polygon: ______________cm	**Depth variation**: (0-20cm) ○ 1 ○ 2 ○ 3 ○ 4 (>100cm)
Type / Month or Year of last significant disturbance (e.g., hurricane, major flood, levee breach)	/
Area of Point/Polygon influenced by recent (within 3 yr) management actions	%

Management Infrastructure and Practices Affecting Hydrology and Vegetation

	Present / % Area Affected			Pres. / % Affected	
Impoundments	/	%	Flooded upland vegetation	/	%
Moist-soil management	/	%	Food plots	/	%
Water control structure	/	%	Emergent marsh manage.	/	%
Drawdowns	/	%	Restoration/mainten. (<1yr)	/	%
Passive Management	/	%	Mowing	/	%
Active Management	/	%	Herbicide Application	/	%
Burned Areas	/	%	Old strip mines	/	%

Topographic Complexity	Vegetation Structure Complexity
(Monotypic) ○ 1 ○ 2 ○ 3 ○ 4 (Complex)	(Monotypic) ○ 1 ○ 2 ○ 3 ○ 4 (Complex)

Wetland Polygon Hydrology - Stressors

Sheet 3

Site:____________ Wetland Polygon:____________ Evaluator(s):__________ Date:____/____/______

Complete one form for each wetland polygon within each grid or marsh bird survey point within each site.

Relative influence of water sources (NP = not present, 1 = somewhat influential, 2 = moderately influential, 3 = most influential)

Water Sources		Hydrologic Connectivty	
Stream Inflow (creeks, rivers)	○ NP ○ 1 ○ 2 ○ 3	Connectivity to river/stream	○ NP ○ 1 ○ 2 ○ 3
Springs (seeps)	○ NP ○ 1 ○ 2 ○ 3	Connectivity to other wetland types	○ NP ○ 1 ○ 2 ○ 3
Lake	○ NP ○ 1 ○ 2 ○ 3	Connectivity to tidal surge	○ NP ○ 1 ○ 2 ○ 3
Precipitation / Snow melt	○ NP ○ 1 ○ 2 ○ 3	Water control struct. influence	○ NP ○ 1 ○ 2 ○ 3
Pumps	○ NP ○ 1 ○ 2 ○ 3	Other: ____________	○ NP ○ 1 ○ 2 ○ 3
Overbank flooding	○ NP ○ 1 ○ 2 ○ 3	Other: ____________	○ NP ○ 1 ○ 2 ○ 3

Hydrologic and Vegetation Influences

Pumps - In for water supply	○ NP ○ 1 ○ 2 ○ 3	Pumps - Out for irrigation	○ NP ○ 1 ○ 2 ○ 3
Railroad Bed	○ NP ○ 1 ○ 2 ○ 3	Dams, Dikes, Levees	○ NP ○ 1 ○ 2 ○ 3
Roads	○ NP ○ 1 ○ 2 ○ 3	Field Tilling	○ NP ○ 1 ○ 2 ○ 3
Ditches	○ NP ○ 1 ○ 2 ○ 3	Excavation / Dredging	○ NP ○ 1 ○ 2 ○ 3
Vehicle Ruts (ATVs, other)	○ NP ○ 1 ○ 2 ○ 3	Point source of pollution	○ NP ○ 1 ○ 2 ○ 3
Water turbidity	○ NP ○ 1 ○ 2 ○ 3	Culverts	○ NP ○ 1 ○ 2 ○ 3
Upland plant species in wetland	○ NP ○ 1 ○ 2 ○ 3	Concrete / Asphalt cover	○ NP ○ 1 ○ 2 ○ 3
Dead trees	○ NP ○ 1 ○ 2 ○ 3	Sediment Deposition	○ NP ○ 1 ○ 2 ○ 3
Stormwater inputs (direct)	○ NP ○ 1 ○ 2 ○ 3	Algae mats	○ NP ○ 1 ○ 2 ○ 3
Burning	○ NP ○ 1 ○ 2 ○ 3	Grazing by domestic animals	○ NP ○ 1 ○ 2 ○ 3
Deep ponds / irrigation pits	○ NP ○ 1 ○ 2 ○ 3	Disking or farming (food plots)	○ NP ○ 1 ○ 2 ○ 3
Insect/Disease veg. damage	○ NP ○ 1 ○ 2 ○ 3	Dumping of garbage, etc.	○ NP ○ 1 ○ 2 ○ 3
Herbicide applications	○ NP ○ 1 ○ 2 ○ 3	Mowing or Haying	○ NP ○ 1 ○ 2 ○ 3
Forest cutting / clearing	○ NP ○ 1 ○ 2 ○ 3	Filling / dirt work	○ NP ○ 1 ○ 2 ○ 3

Vegetation and Habitat Quality Indicators

Point/Polygon Flooded:____________% (All below are % of this area 0-100%)

Shallow (<45cm):____________________%	Herbaceous vegetation (moist-soil):__________ %
With Dense Emergent Vegetation:____________%	Scrub-shrub (<6m woody vegetation):__________ %
Hemi-marsh (70%-30% interspersion):__________ %	Forested (<6m woody vegetation):____________ %
Submersed or Floating Leaf Vegetation:________ %	Invasive Species: ____________________ %
Open water (<30% vegetation):____________ %	Algae/Non-rooted FLAV:____________________ %

Point/Polygon Not Flooded:____________% -----> Mudflats (<30% vegetation):________________ %