Advanced Identification (ADID) Study Kane County, Illinois

Final Report
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Prepared by

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northeastern illinois planning commission

Executive Summary

The Kane County Advanced Identification of Aquatic Resources (or ADID) study is a cooperative effort between federal, state, and local agencies to inventory, evaluate, and map high quality wetland and stream resources in the county. ADID studies are part of a U.S. Environmental Protection Agency program to provide improved awareness of the locations, functions and values of wetlands and other waters of the United States. The primary purpose is to identify wetlands and streams unsuitable for dredging and filling because they are of particularly high quality. This information can be used by federal, state and local governments to aid in zoning, permitting and land acquisition decisions. In addition the study can provide information to agencies, landowners, and private citizens interested in restoration or acquisition of aquatic sites.

Protection and management of wetlands in Kane County is critical to minimize the impact of urban development on important wetland resources. A GIS based wetland inventory was developed for this project which identifies 27,368 acres of wetland in the county, representing approximately 8.2% of the county's total land area. Although it is difficult to determine how the current wetland acreage compares to pre-settlement conditions, hydric soils can be used as an indication of areas that were once, or are currently, wetlands. Kane County has approximately 103,864 acres of hydric soils, representing 31% of the entire land area of the county. This indicates that the current wetland area of 8.2% represents a substantial loss of wetlands. In addition, most remaining wetlands have been degraded.

To improve the understanding and ultimately the protection of remaining wetland and stream resources, wetland functions of particular concern were identified and prioritized by a Planning and Policy Committee (PPC) formed in the early stages of this study. An interagency Technical Advisory Committee (TAC) developed an evaluation approach that refined the list to two categories of wetland function, habitat value and water quality/stormwater storage value. The approach included an assessment of the *opportunity* of a wetland to perform a specified function as well as its expected *effectiveness* in performing the function. Wetlands and streams were evaluated through GIS screening, aerial photo interpretation, and field evaluation and then placed into one of the following categories.

1) High Habitat Value Wetlands and High Quality Streams: Wetlands and streams were identified as having high quality wildlife habitat, high floristic quality, or high quality aquatic habitat. These high habitat value wetland sites and high quality stream sites are considered unmitigatable because the complex biological systems and functions that they support cannot be successfully recreated within a reasonable time frame using existing mitigation methods.

2) High Functional Value Wetlands: These are wetlands that were identified as providing very important water quality and stormwater storage benefits to Kane County. In evaluating water quality/stormwater storage functions, an intermediate category of wetlands was identified. These are wetlands whose functions were evaluated and which met certain basic criteria of “significant functional value” but which did not qualify for the "high functional value" rating at the time of evaluation. Their functions should be considered for watershed planning and mitigation decisions.

3) Other Wetlands and Streams: This includes all wetlands not placed into one of the two categories above. These wetlands generally were smaller wetlands that were not thoroughly evaluated due to project resource constraints; or they were wetlands that were evaluated but did not meet the criteria for high habitat value or high functional value. Certain wetlands that were not evaluated because of their small size may perform very important functions. This category also includes streams for which no quality information existed at the time of the study and streams which could not be evaluated because no methodology for their evaluation existed at the time of this study. This latter group includes all headwater streams.

It was determined that 139 wetlands totaling 5,788 acres met the criteria for high habitat value. Thus, high habitat value wetlands comprise approximately 1.7% of the 334,080 acres that make up the entire area of Kane County, and approximately 21% of the county’s 27,368 acres of wetland area. About one third of the acreage of high habitat value wetlands are within Kane County Forest Preserve or Illinois Natural Area Inventory site boundaries.

Including the Fox River, 70.5 of a total 418 river and stream miles in Kane County, or 17%, were designated high quality. High quality stream segments were found on several different named streams and rivers scattered throughout the county including Big Rock Creek, East Branch Big Rock Creek, Blackberry Creek, Ferson/Otter Creek, the Fox River, Mill Creek, Poplar Creek, Tyler Creek, Waubonsie Creek, Welch Creek, Burlington Creek, and Union Ditch #3.

A total of 372 wetlands, comprising 10,745 acres, or 3.2% of the entire area of Kane County, met the criteria for high value for stormwater and water quality functions. Wetlands of high value for these functions comprise approximately 39% of the county’s 27,368 acres of wetland area.

The total acreage of wetlands designated as high value (including high habitat value and high value for stormwater and water quality functions) is 16,533. This makes up approximately 5% of Kane County’s entire area and represents 60% of the total wetland acreage in the county.

I. Introduction

A. Background and Purpose

Federal regulation of the discharge of dredged or fill material into wetlands or other waters of the United States is authorized under Section 404 of the Clean Water Act. Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers (COE) to require permits for filling activities and provides the U.S. Environmental Protection Agency (USEPA) with oversight and veto authority. Part 230.80 within the 404(b)(1) Guidelines authorizes the USEPA and the COE to identify in advance of specific permit requests, aquatic sites which will be considered as areas generally unsuitable for disposal of dredged or fill material. This process is called an Advanced Identification or ADID. Under the ADID process identification of an area as generally unsuitable for fill does not prohibit applications for permits to fill in these areas. Therefore, the ADID designation of unsuitability is advisory, not regulatory. In the Kane County ADID project, designations of unsuitability were applied to certain sites, including *wetlands* and *streams*, exhibiting exceptionally high habitat value. This designation lets a potential applicant know in advance that a proposal to fill such a site is not likely to be consistent with the 404(b)(1) Guidelines and the USEPA will probably request permit denial. It is important to emphasize that the Kane County ADID attempted to identify wetlands or other waters of the U.S. of exceptionally high habitat value. These sites were determined to be unsuitable for filling activities based on consideration of the 404 (b)(1) Guidelines. It also is important to note the following: ***no determination regarding suitability/unsuitability has been made for any of the wetlands or other waters of the U.S. not identified in this study***. ADID also allows for the identification of other sites that provide important functions requiring special protection, although some modifications may be allowed. In the Kane County ADID project, this type of “high functional value” designation was applied to certain wetlands that provide important stormwater storage and water quality protection benefits. In general, a goal of the ADID process is to shorten permit processing time and to provide some level of predictability to the 404 regulatory program. Not only does an ADID have value to the federal regulatory program, it also can provide information which can be used by state and local governments to aid in zoning, permitting, or land acquisition decisions. Another goal of ADID is to provide information to agencies, landowners, and private citizens interested in restoration or acquisition of aquatic sites. Historically wetland protection measures in Kane County have included federal regulations, conservation and drainage easements, land dedications to and acquisitions by government agencies, primarily the Kane County Forest Preserve District, Illinois Department of Natural Resources (IDNR) and some park districts. However, with the rapid pace of urban development, particularly in the last decade, unacceptable loss and/or degradation of wetlands have continued to occur in the county. The ADID study described in this report is a cooperative effort between federal, state, and local agencies to inventory, evaluate, and map high value wetland resources in the county. From the federal perspective, the primary purpose of this ADID study is to designate wetlands or other waters of the United States which are unsuitable for discharge of dredged or fill material. From the local perspective, the purposes of ADID are to improve the overall protection mechanism for wetlands via improved local regulation, improved predictability in the permitting process, identification of potential mitigation/restoration sites, and identification of potential sites for acquisition. These purposes will be described in greater detail later in this report.

B. Physical Setting - Wetlands, Lakes, and Streams in Kane County

Kane County possesses an abundance of wetland types in a variety of physical settings. Predominant wetland types include palustrine and riverine systems. Palustrine wetlands are found in a wide variety of geographic settings and terrains in the county and include marshes, sedge meadows, graminoid fens, forested fens, wet prairies, northern flatwoods, forested pools, and ponds. Lacustrine wetlands are less common. All known lakes in Kane County are either part of a large marsh system (a palustrine wetland system), or are man-made or significantly modified. There are several high quality streams and associated wetlands in the county, including Big Rock Creek and its tributaries where recent studies have revealed an unusually high degree of biotic diversity including several rare native species. An inventory developed for this project identifies 27,368 acres of wetland in the county, representing approximately 8.2% percent of the total land area of the county. Although it is difficult to determine how the current wetland acreage compares to pre-settlement conditions, hydric soils can be used as an indication of areas that were once, or are currently, wetlands. Kane County has approximately 103,864 acres of hydric soils, representing 31% of the entire land area of the county. This indicates that the current wetland area of 8.2% represents a substantial loss of wetlands. In addition, most remaining wetlands have been degraded. Historically, probably the most significant causes of wetland and stream degradation in the county were draining and channelization for agricultural purposes. In the more recent past, degradation has been caused primarily by urban development activities, including isolated filling, excavation, draining, construction site erosion, and discharge of untreated stormwater runoff. Despite these continuing disturbances, wetlands and streams offer considerable benefits to the residents of Kane County. To the casual observer, wetlands and stream corridors enhance natural aesthetics and serve as buffers between adjacent developments. These areas comprise a substantial percentage of the public open space within the county and offer recreational opportunities such as hiking, cross country skiing, and nature study. The diverse ecosystems within wetlands offer necessary habitat for wildlife and plant communities, including many threatened and endangered species. Wetlands in the county are critical in controlling flooding and in protecting hydrologic cycle functions such as groundwater recharge, flow attenuation, and maintenance of baseflows. Wetlands also are crucial to the protection of water quality in the county's many lakes and streams. In particular, wetlands stabilize shorelines and serve as effective filtering and settling devices for sediments, toxic pollutants, and nutrients. The rivers and streams of Kane County are worthy of special attention. Several Kane county stream and river reaches are still classified as "unique" or "highly valued" based on the biotic integrity of their fish and other aquatic communities.

C. Related Activities: The Kane County Fen Study

Kane County conducted a study of the location of fens and their associated recharge areas during the period that this ADID study was conducted. Sites that have the soils, hydrology, and plants necessary to qualify as fens were discovered or verified. The goals of the fen study include 1) developing a defensible fen definition (including the plant species, soil types, geological formations, and water chemistry common to fens), 2) establishing a procedure for the delineation of fens and their recharge areas, and 3) producing planning level maps of the location of recharge areas for field identified fens in Kane County. Field identification of fens and mapping of fen locations were carried out in conjunction with the ADID study. During the ADID process plant specialists confirmed the presence of calciphiles in suspected fen areas. An environmental consulting firm then worked with the county to carry out tasks such as the classification and identification of the soils present, and the installation of well points near the soil borings. The consulting firm utilized the County's GIS layers and other sources to produce planning level maps of fens and fen recharge areas. The final documents produced for this study will be used to consider additional protections for fen recharge areas. This may include modifications to existing land use plans and existing ordinances, the development of a new fen protection ordinance, as well as the purchase of fens and fen recharge areas.

D. Procedure

1. Project Scope of Work

The scope of work for the ADID project consisted of the following tasks:
1. Form and Coordinate Technical Advisory Committee (TAC) and Planning and Policy Committee (PPC)
2. Identify, Develop, and Map Existing Wetlands Database
3. Develop Kane County Objectives and Strategy for Wetland Protection and Management
4. Develop and Document Wetland Evaluation Methodology.
5. Collect Background Data and Incorporate into Geographic Information System (GIS) Database
6. Apply Screening Methodology to Identify Wetlands for Field Inspection
7. Field Inspection
8. Determine and Map Final (draft) ADID Sites for Public Review

9. Final Reporting and Mapping
10. Develop Public Education/Technical Assistance Materials
11. Produce Final ADID Product on CD-ROM and Develop Customized GIS Interface for Display, Query, and Mapping.
12. Conduct Workshop

2. Technical Advisory Committee (TAC)

A technical advisory committee (TAC) was formed to advise project staff on technical issues, particularly the development of evaluation methodologies for wetlands and streams. TAC members also contributed substantial time evaluating wetlands and streams, both in the office and the field. The TAC consisted of the following invited agencies and organizations:
U.S. Environmental Protection Agency, Region 5
U.S. Army Corps of Engineers, Chicago District
U.S. Department of the Interior, Fish and Wildlife Service, Chicago Illinois Field Office
USDA, Natural Resources Conservation Service
Illinois Department of Natural Resources, Division of Natural Heritage
Illinois Department of Natural Resources, Division of Fisheries
Illinois Nature Preserves Commission
Kane County Department of Environmental Management
Kane County GIS Technologies
Kane County Development Department
Kane County Forest Preserve District
Kane-DuPage Soil and Water Conservation District
Northeastern Illinois Planning Commission

3. Planning and Policy Committee (PPC)

A Planning and Policy Committee also was formed early in the project. Its principal role was to advise project staff on policy, particularly the determination of wetland functions important to Kane County and the development of a wetland protection and management strategy. The
PPC included all of the members of the TAC as well as members of the following organizations:
Western Illinois University
Fox Valley Land Foundation
St. Charles Park District
Conservation Design Forum
The Illinois Environmental Protection Agency
Fox River Ecosystem Partnership
Home Builders Association of Greater Fox Valley
The Sierra Club

The City of Batavia
Max McGraw Wildlife Foundation
IDNR Office of Resources Conservation
Kane County Stormwater Committee

PPC members were asked to identify the goals and interests of their respective agencies with respect to wetland protection in Kane County. Some of the identified objectives included designation of high quality sites for regulation, acquisition, and management; protection of stormwater, water quality, and habitat functions; and identification of criteria for wetland protection and mitigation. The committee recommended that the following functions be considered and evaluated: habitat functions; water quality mitigation functions; stormwater storage functions; and groundwater functions. These functions were evaluated and refined by the TAC before a final list was agreed upon. (See discussion under the Wetland Evaluation Methodology Chapter.) The PPC also advised the project team on the designation of high value wetlands. The following designations were agreed to. High Habitat Value Wetlands and High Quality Streams: Wetlands and streams were identified as having high quality wildlife habitat, high floristic quality, or high quality aquatic habitat based on the methodology that is described later in this report. These high habitat value wetlands and high quality streams are considered “irreplaceable” and unmitigatable based on the fact that the complex biological systems and functions that these sites support cannot be successfully recreated within a reasonable time frame using existing restoration or creation methods. High Functional Value Wetlands: These are wetlands that were identified as providing very important water quality and stormwater storage benefits to Kane County. A site was identified as being of high functional value if it met three of the four criteria for water quality/stormwater storage functions, or if it met one or more of the criteria for water quality/stormwater storage functions and was located in a critical position with regard to the watershed/landscape. The PPC also advised the project team on the development of a protection and management strategy for wetlands and streams. This strategy, presented in Chapter II, identified four principal elements:

- education,
- regulations/best management practices,
- acquisition, and
- restoration.

II. Wetland Protection and Management Strategy

A. Purpose and Background

The purpose of this wetland protection and management strategy is to utilize the ADID results in the most effective way to further the goals of wetland protection and restoration in Kane County. This was accomplished by working with the TAC and PPC to develop a countywide strategy for wetland protection.

The PPC provided recommendations for a strategy early in the project. In particular, it identified the initial elements of a wetland protection and management strategy that follow. These subsequently were used by the project team in methodology and strategy development and refined into a final strategy.

- Evaluate wetland functions as they relate to watershed and land use
- Identify high value wetland and water resources and what steps are necessary to protect them
- Consider issues of wetland complexes and water sources for high value wetlands
- Identify potential restoration sites and develop guidance for voluntary restoration
- Consider mitigation banking options
- Develop BMP's to protect wetland functions
- Develop guidance for tailoring local wetland protection ordinances
- Develop guidance for local governments regarding ADID information and public education
- Develop guidance regarding wetlands and stormwater management
- Develop recreational access guidelines (e.g., trails)

The first three elements were addressed in the process of identifying and evaluating wetland value. The remaining recommended elements can be lumped into the four general categories of education, regulations/best management practices, acquisition, and restoration. Recommended strategies for each of these components are described in the remainder of this chapter.

B. Education

The project scope of work, the *Kane County Stormwater Ordinance* and the *Kane County Comprehensive Stormwater Management Plan* recognizes the critical importance of education to achieve wetland protection objectives. Education should address, at a minimum, the following wetland topics: wetland functions and values, the need for improved protection strategies, and restoration opportunities. Education initiatives should be targeted to local governments as well as members of the public. Education ideally will lead to increased support for effective ordinance, acquisition, and restoration programs and will increase interest in volunteer programs.

Important education objectives were accomplished in the development of an ADID brochure for Kane County, the development of two informational newsletters sent out during the project period, the creation and distribution of a CD holding the ADID data, final report, and maps and an educational workshop designed to:

- Summarize results of ADID evaluations and the countywide wetland inventory;
- Characterize, in non-technical terms, critical wetland functions and rationale for increased protection and restoration;
- Describe appropriate, county-based protection and restoration strategies and BMPs; and
- Describe appropriate wetland protection roles for private citizens and interest groups.

C. Regulations/Best Management Practices

1. Regulatory Components

There are several relevant regulatory components of the Kane County ADID. The first is its use in the context of a countywide "stormwater" ordinance developed by the Kane County Stormwater Committee (KCSC) (See next page for ordinance requirements). The *Kane County Comprehensive Stormwater Management Plan* concluded that the protection of streams and wetlands should be addressed.

The Plan recommended that stream and wetland protection be incorporated in the countywide ordinance. The Plan further called for:

- Prohibit significant disturbance of unmitigatable wetlands;
- Demonstrate that there is no practical alternative to necessary wetland impacts;
- Minimize the wetland disturbance;
- Buffer protection for all water bodies and wetlands; and
- Setbacks along all water bodies and wetlands.

Finally, the ADID results regarding high habitat value wetlands, high quality streams, and high functional value wetlands have been provided to the Corps of Engineers, Chicago District. The Corps, as it did in Lake and McHenry Counties, intends to utilize this information in making decisions under the Section 404 program. ADID information might also be utilized by the Corps, and permit applicants, in evaluating appropriate locations for offsite mitigation or mitigation banks.

2. Implementation for Kane County Stream and Wetland Protection Regulations

In order to optimize the strengths of existing regulatory programs and to minimize financial burdens on local government, the development and implementation of countywide regulations for stream and wetland protection have been met with the adoption of the Kane County Stormwater Ordinance.

3. Ordinance Provisions

Following are specific requirements of the Kane County Stormwater Ordinance that are intended to meet the previously stated objectives of the *Kane County Comprehensive Stormwater Management Plan* and the conditions for feasible implementation.

The existing countywide ordinance does specifically include protections for wetland and stream resources that are not under the United States Army Corps of Engineers jurisdiction. These protections are listed below.

1) Wetland buffer requirement. Section 418 of the Kane County Stormwater Ordinance requires buffers around all preserved wetlands, based on the wetland's Floristic Quality Index (FQI).

2) Depressional storage volumes are protected. Section 201(g) of the Kane County Stormwater Ordinance requires all depressional storage volumes to be preserved as an additional volume to required site runoff storage.

3) Runoff pretreatment is required before discharge to any downstream areas. Section 203(g)(1) of the Kane County Stormwater Ordinance requires that treatment of the first 0.75 inch of rainfall event over the hydraulically connected impervious area of new development shall be stored below the elevation of the primary gravity outlet (retention) of the site runoff storage facility.

4) Wetland preservation during development. Section 417. of the Kane County Stormwater Ordinance requires preserved wetlands to be protected during development such that an FQI calculated two years after the commencement of development will not be more than 2 points less than the FQI originally calculated. The developer shall mitigate for any wetland not so preserved at the ratio required for the FQI originally calculated.

5) Wetland Impacts and Mitigation. Article 15. of the Kane County Stormwater Ordinance states in part that mitigation for wetland impacts shall be in the following manner 1) wetland mitigation facility; 2) purchase of credits from a wetland mitigation bank; 3) payment of fee-in-lieu of mitigation. Mitigation ratios shall be based on FQI. For wetland impacts upon wetlands with an FQI of less than 7 mitigation shall be at a ratio of 1:1. Wetland impacts upon wetlands with an FQI of 7 or more but less than 16 shall be mitigated at a ratio of 2:1. Wetland impacts upon wetlands with an FQI of 16 or more but less than 25 shall be mitigated at a ratio of 3:1. Wetland impacts upon wetlands with an FQI of more than 25 shall be mitigated at a minimum ratio of 10:1 plus one half for each point by which the FQI exceeds 25 rounded up to the nearest whole number. Wetland impacts upon wetlands inhabited by a threatened or endangered species shall be mitigated at a ratio of 3:1.

6) Linear buffer requirements. Section 418 of the Kane County Stormwater Ordinance requires minimum buffer widths for lineal Waters of the U.S. dependent on the presence of wetlands, floodplains and drainage area.

7) Use of wetlands for stormwater management is discouraged. Section 1503(b) of the Kane County Stormwater Ordinance allows the applicant to request permission to mitigate within a site runoff storage facility if the impacted wetland has an FQI of less than 7.

D. Acquisition

The ADID database, particularly the identification of high habitat value and high functional value wetlands, will be valuable to land acquisition agencies -- park districts, Kane County Forest Preserve District, Illinois Department of Natural Resources, and local land trusts – in assessing acquisition priorities. Other information from the ADID database, including wetland complexes, and riparian wetlands, also could be useful in determining acquisition priorities. Finally, it is recommended that recreational access guidelines (e.g., for trails) be implemented to minimize habitat interference with high quality habitats while enhancing public access and awareness.

E. Restoration

In addition to identifying high habitat value wetlands and high functional value wetlands, the ADID database also will be very useful in identifying lower quality sites with restoration opportunities. Kane County has an extensive GIS database, which includes frequently updated aerial photography and 2-foot topography. The availability of digital soil maps and other types of GIS data and mapping capabilities greatly facilitates this objective.

Criteria that might be considered for determining desirable wetland restoration sites include:

- Size;
- Land use/ownership;
- Hydric soils (or categories of hydric soils);
- Historical drainage patterns (as identified by NRCS);
- Adjacency or proximity to other wetlands, or high quality wetlands;
- Historic wetland loss within watershed;
- Adjacency to (or within watershed of) high quality streams; and
- Adjacency to existing forest preserves property.

Most of these criteria could be readily evaluated by applying GIS screening technology to the ADID database and other digital databases.

III. Evaluation Methodology

A. Methodology Overview

1. Background

The purpose of the Advanced Identification (ADID) study is to provide information on the location and value of wetland and stream resources in Kane County. The ADID study can be a tool for making development and resource conservation decisions and should be useful as a planning tool for local governments, land management agencies, and other public and private landowners. To improve the understanding and ultimately the protection of wetland and stream resources, it is first important to identify and evaluate the relevant functions that they provide. It also is important to identify those wetland and stream resources that are particularly important with respect to their quality and functions. The rationale for distinguishing among wetlands based on their quality was that wetlands of high quality merit special consideration when considering protection, mitigation, and management needs.

2. Determination of Important Wetland and Stream Functions

Federal guidance on conducting ADID studies encourages local entities to tailor wetland evaluations so that functions of local importance are addressed. To that end, wetland functions of particular concern were identified and prioritized by the Kane County ADID Planning and Policy Committee (PPC). An interagency Technical Advisory Committee (TAC) refined the list to those functions that could realistically be addressed using the available resources. This process led to the identification of two categories of functions: habitat value and water quality/stormwater storage value. The individual functions evaluated within these categories are as follows:

<u>Habitat Value:</u>

- Wildlife Habitat/Floristic Diversity
- Presence and Locations of Fens within Larger Wetland Complexes
- Stream Aquatic Habitat

<u>Water Quality/Stormwater Storage Value:</u>

- Shoreline and Streambank Stabilization
- Sediment and Toxicant Retention
- Nutrient Removal and Transformation
- Stormwater Storage and Hydrologic Stabilization

3. Determination of High Habitat Value and High Functional Value Wetlands

The development of a methodology for identifying high value wetlands in Kane County relied both on existing wetland evaluation methodologies and the technical expertise of members of the technical advisory committee. The resulting methodology builds on methodologies used in nearby McHenry and Lake Counties. The methodology had to be designed to do two things: 1) identify the values of individual wetlands; and 2) identify wetlands of such high value that they merit special consideration for protection strategies. It is important to understand that the methodology was designed to handle a large number of wetlands (nearly 3500 in Kane County). This was accomplished by first setting size thresholds to limit the number of wetlands and then performing more thorough evaluations, such as aerial photography interpretation and field checks, on those wetlands that appeared likely to have important values.

The approach developed by the TAC involved Geographic Information System (GIS) screening, aerial photo interpretation, and field evaluation. This approach includes an assessment of the *opportunity* of a wetland to perform a specified function as well as its expected *effectiveness* in performing the function. Wetlands and streams were evaluated and then placed into one of the following categories.

1) High Habitat Value Wetlands and High Quality Streams: Wetlands and streams were identified as having high quality wildlife habitat, high floristic quality, or high quality aquatic habitat. These high habitat value wetland sites and high quality stream sites are considered “irreplaceable” and unmitigatable based on the fact that the complex biological systems and functions that these sites support cannot be successfully recreated within a reasonable time frame using existing mitigation methods.

2) High Functional Value Wetlands: These are wetlands that were identified as providing very important water quality and stormwater storage benefits to Kane County. In evaluating water quality/stormwater storage functions, an intermediate category of wetlands was identified. These are wetlands whose functions were evaluated and which met certain basic criteria of “significant functional value” but which did not qualify for the "high functional value" rating at the time of evaluation. Their functions are recorded in the ADID database and should be considered for watershed planning and mitigation decisions.

3) Other Wetlands and Streams: This includes all wetlands not placed into one of the two categories above. These wetlands generally were smaller wetlands that were not thoroughly evaluated due to project resource constraints; or they were wetlands that were evaluated but did not meet the criteria for high habitat value or high functional value. It is important to note that certain wetlands that were not evaluated because of their small size may perform very important functions. This category also includes streams for which no quality information existed at the time of the study and streams

which could not be evaluated because no methodology for their evaluation existed at the time of this study. This latter group includes all headwater streams.

A Note on Farmed Wetlands: The decision was made not to assess farmed wetlands for value in the Kane County ADID study. Farming precludes the establishment of wetland vegetation. Without wetland vegetation, and with the disturbances associated farming activities (e.g., pesticide applications, plowing, and drainage), habitat value, shoreline/streambank stabilization, sediment and toxicant retention capabilities, and nutrient removal values will be less than in non-farmed wetlands. Although farmed wetlands could be candidates for the stormwater storage significant value determination, they could not qualify for high functional value since that would require meeting significant value requirements of 3 out of 4 of the water quality/stormwater retention functions. For these reasons certified farmed wetlands and farmed wetland pasture from NRCS appear on wetland maps produced for this study as “farmed wetlands” but were not evaluated for their values.

B. Wetland and Stream Inventories

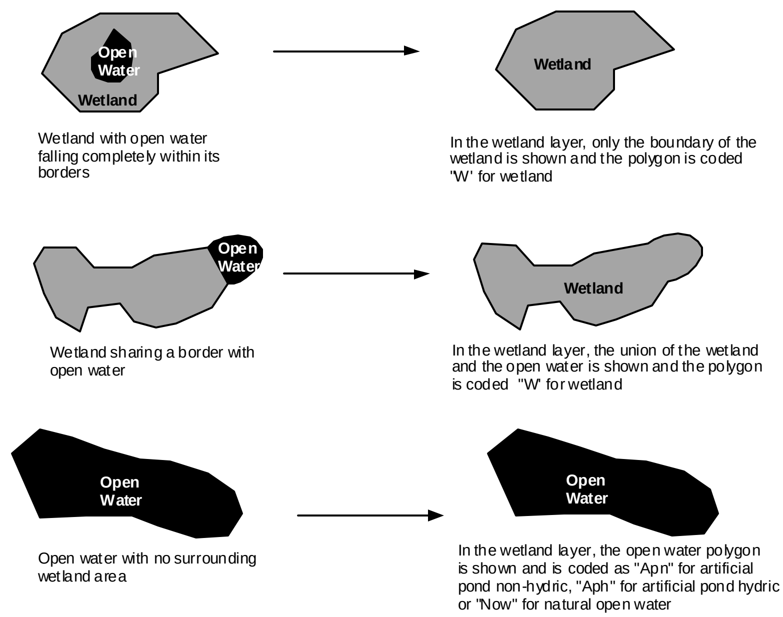
The ADID evaluation methodology was dependent on the availability of an accurate database describing the locations and extents of wetlands and streams in Kane County. Geographic Information Systems technology was used to create and maintain a database of wetlands and streams in Kane County, to query and display wetland and water resources information collected during the ADID project, and to overlay ADID data on other natural resource layers.

1. The ADID Wetland and Open Water Inventories

An early challenge in the project was the development of an accurate database of wetlands in the county. Information from two different wetland inventories was used in the development of the ADID database: the National Wetland Inventory (NWI) developed by the U.S. Fish and Wildlife Service (USFWS) with the assistance of the Illinois Department of Natural Resources in the early 1980s; and the Natural Resources Conservation Service (NRCS) Wetland Inventory. It was apparent that neither of these inventories was adequate alone. The NWI was becoming dated, particularly considering the substantial urban development activity in the county since the early 1980s. The principal purpose of the NRCS inventory was to identify wetlands in agricultural areas and, therefore, it was not complete in urbanized areas. As a consequence, the ADID project team decided to create a base wetland inventory of its own using black and white digital aerial photography from 1996-1998 and digital SSURGO soils for Kane County created by the NRCS. The ADID wetland inventory was created at Northeastern Illinois Planning Commission. Extensive review by the ADID Technical Advisory Committee lead to many modifications before the inventory was finalized. The ADID wetland inventory was created by overlaying hydric soils on the aerial photography. Areas of hydric soil that did not appear to be developed or urbanized on the aerial photography were captured as wetlands using Geographic Information Systems. The NRCS Wetland Inventory and the NWI were used for reference and, in some cases, to help define wetland boundaries. A 2-foot topographical digital layer from Kane County was also used to help identify boundaries between wetland and upland areas. Streams and ditches were also captured from the aerial photography as part of this the inventory. If these did not appear to be flanked by wetlands they were coded as linear water features (lwf) in the database. If they were surrounded by wetland they were included in the capturing of the larger wetland area and coded as wetland (w) in the database. Farmed wetlands were not captured during the creation of the ADID wetland inventory. Instead certified farmed wetlands from NRCS were used in conjunction with, but not merged with, the ADID database. In some cases wetlands captured for the ADID inventory were declared to be farmed wetlands during Technical Advisory Committee reviews. In this case they were coded as farmed wetlands (fw) and kept as part of the ADID inventory. Ponds and lakes, including natural open water (now) and artificially constructed ponds, were captured for the ADID inventory. Artificial ponds were characterized as artificial pond hydric (aph) or artifical pond non-hydric (apn) depending on whether they intersected with hydric soils polygons from the SSURGO soils layer. Islands within the Fox River were also captured and characterized as islands (is) in the database.

Two separate layers were created from the ADID base inventory. One was an open water layer that included polygons representing artificial ponds, natural open water and the Fox River. The other was a layer representing all wetlands including open water polygons. In the wetland layer if an open water area fell within or shared a border with a wetland polygon, the entire polygon was coded as “wetland” and no separate borders for the open water polygon were included. However if an open water polygon was not surrounded by or bordering a wetland polygon then the open water polygon was included in the wetland layer and coded as aph, apn, or natural open water.

FIGURE 1. The Display of Open Water in the Wetland Layer.



Thus to see open water that falls within a larger wetland, the open water layer must be overlain on the wetland layer. The Fox River is an exception to this rule as it appears in the wetland layer as separate polygons from those wetlands that share a border with it.

Both open water and wetlands were initially captured using black and white aerial photography from 1996-1998. However, the rapid pace of development in Kane County during this project resulted in the creation of many new artificial ponds between the years 1996 (the oldest date of the original photographs used) and 2000. Therefore color aerial photography from 2000 was used to update the open water information by capturing new ponds midway through the project. This updated aerial photography was also used along with updated SSURGO soils data during reviews by the TAC to find areas captured in the initial inventory that had either undergone urban development or which did not appear to have hydric soils according to the updated SSURGO data. These polygons were then coded as non-wetland (nw) in the inventory.

The final wetland inventory and NRCS farmed wetland layer indicates that there are 27,368 acres of Wetland in Kane County representing approximately 8.2% of the county. A breakdown according to wetland type is shown in the table below:

TABLE 1: Breakdown of Wetland Numbers and Acreage By Wetland Type.

Wetland Category	**Number**	**Area (acres)**	**Average Size (acres)**
Wetlands (W)	1,856	20,427	11
Farmed Wetlands from ADID inventory (FW)	59	195.4	3.3
Farmed Wetlands (FW and FWP) and parts of farmed wetlands from NRCS inventory that do not overlap with ADID wetlands	1,455	3,201	2.2
Natural Open Water (NOW)	4	8.3	2.1
Artificial Pond Hydric (APH)	637	1,393	2.2
Artificial Pond Non-Hydric (APN)	222	256.2	1.2
Island in the Fox River (IS)	69	196	2.8
Large River Polygons (Fox River)	12	1691	141
TOTAL	4,314	27,368	

2. Stream Inventory and Linear Water Features

The ADID stream layer was based on the U.S. Geological Survey's National Hydrography Dataset 1:100,000 scale streams layer. This layer draws on information from U.S. EPA's Stream Reach file version 3 (the"RF3") and USGS Digital Line Graph (DLG) coverages. This file generally provided an accurate and complete inventory of county streams. A total of 418 miles of streams were identified in Kane County, ranging in size from small, unnamed headwaters to the Fox River.

Some of the smaller streams and ditches in Kane County were not included in the U.S. Geological Survey's National Hydrography Dataset. We captured ditches and small streams (linear water features--lwf) as polygon features during the creation of the ADID wetland inventory, and we later converted these to line features using aerial photography as a background to draw the linear water features as lines. This line layer was then merged with the National Hydrography Dataset stream inventory in order to produce a layer that would give a more complete picture of the location of streams, including ditches, in the county. An additional 30 miles of small streams and ditches were identified as linear water features bringing the total mileage of streams and ditches identified in Kane County up to 448.

3. Fen Inventory

Kane County conducted a study of the location of fens and their associated recharge areas during the period that this ADID study was conducted. Sites with the soils, hydrology, and plants necessary to qualify as fens were discovered or verified during ADID field evaluation for habitat quality. GIS mapping of fen locations was carried out as part of the ADID study using color and black and white 2001 aerial photography from Kane County, 2-foot topographical contours, hydric soils, and information on fen location provided by members of the ADID field teams. All mapped fens are within high habitat value ADID wetlands. It is possible that fens exist in the county that were not discovered during the fen study and thus are not mapped in this layer. Therefore, this layer includes only known fens; others may also exist.

4. Other Water Resource and Natural Resource Data

Several other relevant digital layers were identified and used in evaluating wetland and stream functions. These additional databases included:

The Chicago Wilderness Fox River Watershed Biodiversity Inventory, The Wetlands Initiative, Chicago, Illinois, 2000.

Location of Potential Fens as Delineated by Dick Young, Kane County Department of Environmental Management, Gevena, Illinois, unpublished data, 2001.

Illinois Natural Area Inventory Sites, Illinois Department of Natural Resources Natural Heritage Database, Springfield, Illinois, unpublished data, 2001

Threatened and Endangered Species Point Locations, Illinois Department of Natural Resources Natural Heritage Database, Springfield, Illinois, unpublished data, 2001

Drainage basin boundaries delineated for USGS streamflow-gauging stations and water-sampling sites using 1:24,000 USGS Topographic paper maps, USGS, unpublished data, 2001

Public Water Supply Surface Water Intakes in Illinois, Illinois State Water Survey, Edition 1.0, Champaign, Illinois, 1994; on-line linkage: http://www.isgs.uiuc.edu/nsdihome/browse/statewide/

Digital Elevation Model (DEM) of Illinois at 1:250,000, Edition 1.0, Illinois State Geological Survey, Champaign, Illinois, 1995; Online_Linkage: http://www.isgs.uiuc.edu/nsdihome/browse/statewide/

Q3 Flood Data (1:24,000), Federal Emergency Management Agency, Washington, DC, 1995.

DFIRM draft data, Kane County Illinois, Federal Emergency Management Agency, Washington, DC.

Kane County's 2-foot topographical contours, Kane County GIS Technology, 1985 and 2001.

Soil Survey Geographic (SSURGO) database for Kane County, Illinois, U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, Texas, 2000; Online Linkage: http://www.ncgc.nrcs.usda.gov/branch/ssb/products/ssurgo/

Soil Survey Geographic (SSURGO) database for Kane County, Illinois, U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, Texas, 2001; Online Linkage: http://www.ncgc.nrcs.usda.gov/branch/ssb/products/ssurgo/

National Wetlands Inventory, U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and Illinois Natural History Survey, 1996
Online_Linkage: www.isgs.uiuc.edu/nsdihome/

NRCS Certified Wetlands in Kane County, Natural Resources Conservation Service, 2003

U.S. Geological Survey's National Hydrography Dataset 1:100,000 scale streams layer. On-line linkage: http://nhd.usgs.gov/

Digital Ortho Aerial Photography from Kane County GIS Technologies:

Black and white 1' resolution 1996-1998 aerial photography
Color 3' resolution, summer 2000 aerial photography, AirPhoto USA
Color 3' resolution, summer 2001 aerial photography
Black and white, 1/2' resolution, spring 2001 aerial photography

Digital Ortho Aerial Photography from Northeastern Illinois Planning Commission:

Black and white 1' resolution, spring 2001 aerial photography

Descriptions of the use of these data bases can be found in other sections of the methodology. All of these data layers were overlain with the wetland and stream inventories at a USGS 7.5 minute quad scale and were utilized by TAC members in evaluating wetland functions.

C. Methodology for Habitat Value

1. Background

Wetlands provide habitat for a variety of plants and animals. Some species of wildlife are completely dependent on wetlands for food, resting areas, breeding sites, molting grounds, and other life requisites. Other animal species use wetlands for only part of their life cycle. Because so many of our wetlands have been lost, a large number of endangered species are dependent on those that remain. At least one third of the nation's threatened and endangered species depend on wetlands; in Illinois over 40% of these species depend on just 2.6% of the landscape (IDNR/USFWS – Illinois Wetlands A Guide for Local Governments). Wetlands also include plant communities that have become rare since settlement times.

One of the goals of the Kane County ADID study was to identify wetland habitats of especially high habitat value. Any site determined to be of exceptional value, for plant or animal life, was considered a high habitat value wetland and therefore deemed important for protection or “unsuitable for fill.” These highest habitat value wetlands cannot be adequately replaced through compensatory mitigation with current technology and understandings. Others, while providing these functions, are not considered as irreplaceable, though their functions remain important.

2. Wetlands - Wildlife Habitat and Floristic Quality/Diversity

The development of the methodology for identifying the high habitat value wetlands of Kane County relied both on existing wetland evaluation methods and the technical expertise of the members of the Technical Advisory Committee. The resultant methodology used in Kane County is adapted from that used in neighboring McHenry County, but tailored for the landscape, geology, and goals of Kane County. The evaluations in Kane County benefited from previous ADID evaluations in nearby McHenry and Lake Counties which utilized other documented evaluation techniques in the development of their methodologies, *e.g*. Wetland Evaluation Technique (WET) (Adamus et al., 1987), the Oregon Method (Roth et al., 1993), the Minnesota Manual (U.S. Army Corps of Engineers, 1988), and the Illinois Natural Areas Inventory (White 1978).

Initially, all wetlands identified in the base inventory that were over 1 acre in size were evaluated using aerial photographs and other information available as GIS data layers for Kane County. This aerial photograph evaluation produced a score for each wetland polygon based on the following criteria. These criteria represent a modification of the methods used for the Lake and McHenry County, Illinois ADID studies (Dreher et al. 1992, NIPC et al. 1998). The criteria represent ecological features which have significant influence on either plant communities or wildlife habitat quality and could be evaluated from aerial photographs. For each criterion a score was assigned ranging from 1 to 4 with 1 being the lowest score and 4 being the highest. For some criteria, there was more than one potential choice that would yield a score of 4.

The aerial screening process was done using black and white aerials taken from 1996-1998 and color aerials taken in 2000. These aerials were presented in GIS and projected onto a screen for evaluation by at least 2 members of the Technical Advisory Team. Soil survey data, 2-foot topographic contours, National Wetland Inventory maps, and a data layer of possible fen locations were also used to aid in scoring each wetland based on the following criteria.

1. Drainage Wetland sites which still exhibited natural drainage patterns, such as unchannelized drainage swales, meandering streams, or were parts of natural lakes or ponds, were considered to be the least disturbed sites and received the best score. Sites that were visibly tiled or ditched and effectively drained or at least partially drained were more disturbed and received a lower numerical score. Obvious impoundments were also considered under this criterion and given lower scores.

2. Excavation Wetlands with no evidence of excavation were considered less disturbed and received the best numerical score while sites which had been excavated received a lower score. Excavations do not always contribute to a degradation of wetland functions, but frequently result in lowered water tables, spoil placed in the wetland, and disturbance induced floristic degradation. Typically, excavations result in conversion of vegetated wetland habitat into open water features.

3. Size Wetlands were divided into four size categories with the larger wetlands receiving the best score. The larger a wetland the more likely it was that it contained either high quality plant communities or high quality wildlife habitat. Larger wetlands have a higher likelihood of containing high quality plant communities due to the fact that interior areas of larger wetlands are buffered from disturbance. Larger wetland areas also provide better wildlife habitat and typically support greater species richness (Brown and Dinsmore 1986). The size classes used in Kane County differ from those utilized in McHenry County. This was done to be reflective of the size distribution of wetlands present in Kane County and the methods used to delineate wetland polygons for the base wetland inventory in Kane County.

4. Physical Intrusions and Barriers Presence of a physical intrusion, such as fill, berm, spoil pile, road, or railroad embankment, or some other physical barrier resulted in a lower score. Wetland polygons that were immediately surrounded and isolated by roads, railroads or urban development also received a low score. Other barriers or intrusions within the wetland polygon were judged for their overall influence on the wetland. If a wetland had a visible farm lane through the middle of the wetland it received a lower score than if the lane was at the edge or a corner of the wetland. Such

barriers frequently will impede wildlife movements and will result in hydrologic discontinuities. Non-native species frequently colonize such disturbances and result in floristic degradation.

5. Surrounding Land Use Surrounding land use within 200 feet of each wetland was categorized as either natural vegetation, old field or pasture, large yard/estate type development, agricultural row-crops, or urban/developed. The less disturbed the surrounding land, the less likely it is for the wetland to be disturbed. Natural or only slightly disturbed landscapes provide good buffers from disturbance and intrusions, and also provide additional wildlife habitat. Wetlands adjacent to land uses such as urban/developed or agriculture (row crops) received a lower habitat score due to the fact that these land uses typically have an adverse effect on water quality and/or disturb wildlife. Where multiple land uses were present, the land use with the greatest influence on the wetland controlled the scoring. For example, if a wetland was one-half surrounded by row-crops, one quarter by large lot residential, and one quarter by pasture, the row-cropped area would have the greatest influence over the wetland and thus dictate the score.

6. Habitat Structure Habitat structure is an excellent indicator of wildlife habitat and plant community quality/diversity. However, the habitat structure of a wetland providing high quality wildlife habitat can be quite different from the habitat structure of a site with good native plant communities. Since this part of the evaluation is considered the most important for biological functions, as it was the only part designed to detect marshes with high quality wildlife habitat structure, a high score from this portion of the evaluation resulted in an automatic field check. The two subsets of habitat structure are vegetative interspersion and plant/open water interspersion. The concepts and interspersion categories used here are based on the work of Golet (1976). These concepts were used in the Lake and McHenry County ADID studies and are further explained in the Minnesota Wetland Evaluation Technique (MWET)(COE 1988).

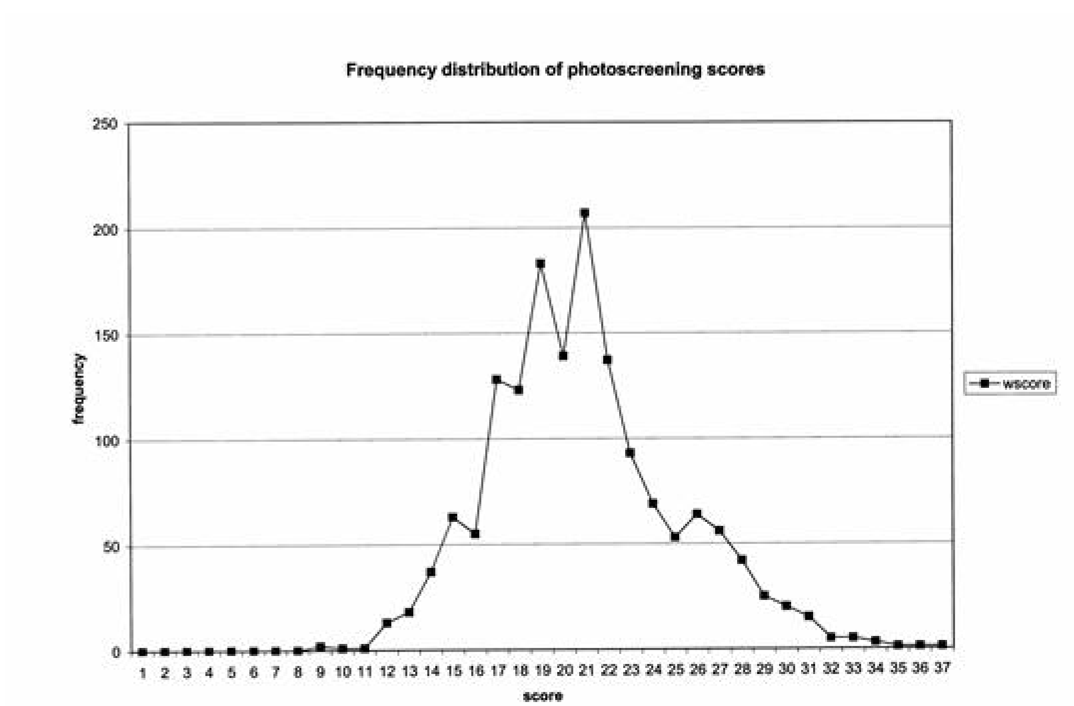
Vegetative Interspersion Wetlands in Kane County which have retained a high degree of their pre-settlement vegetation are often made up of several plant communities. These natural communities may include those listed in Table 2. The presence of three or more communities is a good indicator of a high quality wetland complex. For this evaluation, we used the vegetative interspersion categories from Golet (1976) and MWET (COE 1988), but with the natural communities recognized locally, such as those listed in Table 2. Any wetland unit that had three or more natural communities in any one of the three interspersion categories were considered to be of high quality, while sites with only 1 or 2 community types were rated lower. Particular attention was given to areas with a phototone that suggested the presence of a rare community type such as a fen or forested areas where canopy suggested the potential presence of northern flatwoods. If the photo-interpretation suggested the presence of such a rare community type, it was automatically included for field investigation in the next step of evaluation.

Plant/Open Water Interspersion The type of wetland habitat that most frequently provides high quality habitat for a variety of wildlife, especially wetland dependant birds, is an emergent hemi-marsh. A hemi-marsh exhibits a high degree of interspersion between open water and vegetation. Many of our state endangered and threatened bird species require this type of marsh for breeding. Wetlands consisting of primarily open water or dominated by dense vegetative growth have lower habitat value and less wildlife species diversity (Weller 1981). This type of interspersion can be readily assessed using aerial photographs, and those exhibiting the highest degree of interspersion, following the categories of Golet (1976) and MWET (COE 1988) received the highest score.

These criteria and their numerical scoring are summarized in Table 3.

After the aerial photograph scoring of wetland polygons greater than 1 acre in size was completed and the data entered into a spreadsheet, the distribution of total scores for the wetland polygons was examined. A graph of these scores revealed a normal distribution. The size and both interspersion scores were then weighted by a factor of 2 to emphasize their importance. During the aerial photograph screening process, it became clear based upon our collective experience that these metrics were most indicative and correlated with true high habitat value sites (for known sites). A graph of these weighted scores produced a normal distribution with an obvious break between those with a score of <25 and those with a score of ≥25.

FIGURE 2. Distribution of Weighted Photography Screening Scores.



This scoring cutoff was then tested both in the field and by review of aerial photographs. This review of selected wetlands with a score of 24 or 25 indicated that this scoring threshold was appropriate and meaningful, given our objectives. Therefore, all wetlands with an aerial photograph score of ≥25 or with a habitat structure score of 4 (vegetative or open water) were field investigated. In addition, wetlands that were suspected of containing fens received a site visit regardless of whether they qualified under the other criteria described above.

All of these sites were field evaluated following the INAI (White 1978) general methods without quantitative sampling to support community grades (see Appendix A). Any wetlands which contained Grade A, B, or C wetland communities, or high quality wildlife habitat, or threatened or endangered species were given high habitat value ADID status. Most sites were field evaluated by teams of 2 or more during May through October 2002 with a few sites checked in May and October 2003. An individual experienced with NAI methods and plant identification was a member of each team.

Community types or names were adapted for Kane County, and loosely follow Chicago Wilderness community classification, rather than those used in the INAI. Wetland plant communities found in Kane County are summarized in Table 2.

TABLE 2. Wetland Plant Communty Names Used for Kane County ADID Study.

Wetland Community	Characteristic Plant Species	Moisture Regime
Marsh	Typha spp., Sparganium spp., Acorus calamus, Carex lacustris, Scirpus spp.	Standing water through much of growing season
Sedge Meadow	Carex stricta, Calamagrostis canadensis, Eupatorium maculatum, Asclepias incarnata,	Very shallow inundation early, saturated remainder of season
Graminoid Fen	Carex spp, Cirsium muticum, Solidago ohioensis, Solidago patula, Lobelia kalmii, Parnassia glauca	Saturated with groundwater through most of season
Forested Fen	Thuja occidentalis, Symplocarpus foetidus, Carex spp.,	Saturated with groundwater through most of season
Northern Flatwoods	Quercus bicolor, Carex muskingumensis, Carex lupulina,	Saturated with pockets of ephemeral standing water
Floodplain Forest	Acer saccharinum, Populus deltoides, Boehmeria cylindrica, Pilia pumila, Aster lateriflorus	Seasonally flooded
Wet Prairie	Spartina pectinata, Calamagrostis canadensis, Panicum virgatum, Carex spp, Helenium autumnale,	Saturated early to mesic later in season
Forested Pool	Acer saccharinum, Populus deltoides, Carex spp, Glyceria striata, Alisma subcordatum	Ponded early in season, often dry by end of summer

TABLE 3. Data sheet used for scoring wetlands from aerial photographs.

Kane County ADID Study
Wetland Data Sheet for Biological Functions Pre-field Assessment

General Info/GIS Screen

WETLAND #____________________________ WETLAND NAME _________________

USGS QUAD MAP: ______________________ MAP #: ______________________

LOCATION INFORMATION (TRSQ)___________________________

SIZE: ________________ CLASS: _________________

IS IT PART OF A METAPOLYGON? _______ IF YES, # OF SEGMENTS __________

IS SITE IN INAI? _______ IF YES, CATEGORY____ IF CATEGORY 1, GRADE____

IS SITE IN YOUNG'S BOOK? ___________

IS SITE IN CHICAGO WILDERNESS STUDY? __________

THREATENED OR ENDANGERED SPECIES PRESENT? __________

DOES SITE INTERSECT WITH A FEN AS DELINEATED BY YOUNG? __________

Aerial Photograph Information

1. DRAINAGE	(1)	ditched
	(2)	tile drainage (only if visible)
	(3)	partially drained via ditch or tiles
	(3)	dammed (flow restricted or deep water created)
	(4)	natural, unchannelized drainage swale or meandering stream
	(4)	no visible drainage
2. EXCAVATED	(1)	> 25% excavated
	(2)	11-25% excavated
	(3)	5-10% excavated
	(4)	no visible excavation

3. SIZE
(1) < 5 acres
(2) 5.1-20.9 acres
(3) 21-35 acres
(4) < 35 acres

4. PHYSICAL INTRUSION AND BARRIERS
(1) surrounded by urban development or roads
(1) > 10% filled or divided into > 6 segments
(2) internally divided by barrier or divided into 3-6 segments
(3) < 10% filled or divided into 2 segments, or division separates small proportion of total wetland
(4) no apparent intrusion or divisions

5. SURROUNDING LAND COVER TYPE (within 200 feet)
(1) developed (urban), including gravel pits
(2) farmed
(3) pasture, old field
(4) natural vegetation, undisturbed

6. VEGETATION INTERSPERSION
(1) monotypic or near white phototone typical of reed canary grass monocultures
(2) more than one vegetation type apparent
(3) two or more vegetation types present in concentric circular rings, or as a mosiac
(4)
- category 1, 2 or 3 vegetative interspersion (see chart based on Golet) or;
- gray stippled phototone indicative of native sedge meadow, wet prairie, or fen communities or;
- non-buckthorn native forested community appears present.

7. OPEN WATER INTERSPERSION
(1) cover category 1 or 8
(2) cover category 2 or 7
(3) cover category 4 or 6
(4) cover category 3 or 5

NOTES/INSTRUCTIONS: When more than one condition exists for a given wetland, choose the one that has the most adverse affect or most influence on the wetland (generally the lower score). The cover categories in questions 6 and 7 refer to those developed by Golet. If questions 6 or 7 receive a score of 4, they should be field checked regardless of total score.
COMMENTS (add any notes here on complexes noted during aerial review for later consideration):

TABLE 4. Data Sheet Used for Field Inspections

KANE COUNTY WETLAND INVENTORY
Field report form

TEAM LEADER:__________________________DATE:____________________
WETLAND# ___________ WETLAND NAME:__________________________
LOCATION INFO: T. ___ R. ____ SEC. ____ QUAD:_______________________
APPROX. ACREAGE:_________ WATERSHED: __________________________
IS THIS SITE IN THE FEN PROTECTION STUDY? ________
NATURAL RESOURCES: (note: put complete species lists on back if needed)

Natural Community	Grade	Quality & Disturbance Description (note dominant plant species)

Rare Plants	Rare Animals

OTHER SIGNIFICANT FEATURES:

GEOLOGICAL:____
ARCHEOLOGICAL:____

OTHER:____
OWNERS:____
PROTECTION STATUS:____

MANAGEMENT PROBLEMS AND THREATS:

3. Threatened and Endangered Species

Wetland polygons containing or near records for state or federally listed threatened or endangered species were automatically placed in the high habitat value category, regardless of their community scores. Threatened and endangered species records were correlated to wetland polygons in this ADID study as follows. Only listed species that were considered wetland species, or those that rely upon wetland habitat for at least a part of their life cycle, were included. The Illinois Department of Natural Resources, Natural Heritage Database was the source for threatened and endangered species location records, but local knowledge by agency staff such as Kane County Forest Preserve District and Illinois Department of Natural Resources biologists, was used to refine those records. In some instances, more than one wetland polygon was designated high habitat value based on a single threatened and endangered species location point. This was done when the point fell between two wetlands and the species in question might be expected to depend on both wetlands.

4. Final Designations of Wetlands

Wetlands that scored in the high habitat value category are considered "not suitable for fill" and "unmitigable." Wetlands evaluated but not designated high habitat value are wetlands for which we can describe some important functions, but which are somewhat replaceable. Statements can be made as to the community type present, the community grade (D or E), and the wildlife habitat present for the non-high habitat value wetlands that were field evaluated. For those that are scored according to Figure 2, but with scores less than 25, statements can be made regarding the values provided based on that score. A third group will be those that we did not examine or evaluate due to their small size or severely disturbed nature.

Plant species encountered during all wetland field inspections were recorded. These lists are meant to further describe the plant communties observed and provide an indication of species composition. These lists should not, however, be considered complete or comprehensive, since they are based solely upon single, brief, field inspections.

5. Streams - Aquatic Habitat

The Index of Biotic Integrity (IBI) (Karr 1981, Karr et al. 1986) scoring system as used in Illinois is not calibrated or appropriate for headwaters (smaller) streams. Consistent with statewide application of the IBI rating system, IBI scores are not applied to first order streams. While headwaters streams can be very important to watershed and river health, no scoring system has been developed for use on headwater streams. Thus, it is beyond the scope of this ADID study to rate headwaters streams. **This in no way**

indicates that these unrated headwaters streams are of less quality or importance than the rated streams.

The IBI scoring system used by the IDNR was recently revised based on years of sampling data in Illinois (Smoger 2000, and revised metric-scoring criteria provided through personal communication with Roy Smogor, Illinois Environmental Protection Agency, Surface Water Section, Springfield, Illinois). Scores calculated using the new metrics are designated Revised IBI or RIBI. All fish data used in this study, except the fish data from stations on the Fox River, were subject to recalculation using the new metrics. The RIBI metrics were not designed to be used on systems as large as the Fox River, so the older IBI metrics were used to assess the Fox. The RIBI scores, from existing data provided by the IDNR, were placed on the map of streams for Kane County at the sampling station location that generated the score. The stream lengths to which these RIBI scores were applied were defined by IDNR fisheries biologists according to their knowledge of stream structure and habitat conditions. These segments did not always correspond to IEPA's stream reaches, however IEPA's stream reaches were used as general guides for the extent of stream quality ratings unless expert knowledge indicated that the score was appropriate to only part of an IEPA reach or that it was appropriate to parts of more than one IEPA reach. In several cases there was more than one station location on a single IEPA stream reach. In these cases the reach was divided according to expert knowledge and each segment received the RIBI score of the station to which it best corresponded. Where a single sampling station had a single RIBI score, the score applied was straightforward. For reaches that had multiple scores at the same station, the most recent scores were used to reflect the current conditions more closely. Other unrated stream reaches remain unrated for this study. Using the stream grading system of the Illinois Biological Stream Characterization Study, streams with RIBI scores of greater than 50 are considered Grade A, and streams with an RIBI score greater than 40 (and less than 51) are considered Grade B. For this study, any stream reach with threatened or endangered species records from IDNR's Natural Heritage Database, or that received a Grade A or B are considered high quality streams. Streams with a Grade C or lower designation are not considered high quality streams.

The Fox River mainstem was broken into free-flowing versus impounded reaches, based on Santucci and Gephart's Fox River Fish Passage Feasibility Study (2003). IBI scores were then applied to these reaches using Santucci and Gephart's recent fish sampling data. Applying the IBI ratings to the Fox River segments was very straight forward in the majority of cases. However, one reach had two scores that differed in terms of Biological Stream Characterization Rating. This was an impounded reach in Dundee and Elgin Townships that occurs near the confluence of the Fox River and Tyler Creek. The point of confluence of Tyler Creek and the Fox River was used to separate the reach into two segments, and each of these segments was assigned the Biological Stream Characterization Rating that corresponded to its sampling point. The Fox River IBI scores were reported by Santucci and Gephard using the old IBI metrics, and these IBI scores were used to rate the Fox River reaches in this ADID study because the revised metrics (RIBI) were not designed for use on a system as large as the Fox River.

6. Lakes – Aquatic Habitat

Unlike nearby McHenry and Lake Counties, Kane County is not replete with natural glacial lakes. In fact, all known lakes in Kane County are either part of a large marsh system and were evaluated as part of a wetland system, or are man-made or significantly modified, usually in the form of a gravel pit or small impoundment. These artificial open water features were not evaluated as part of this study, since the purpose was to evaluate waters and wetlands as native ecosystems.

D. Methodology for Water Quality and Stormwater Storage Value

1. Overview of Approach

The evaluation methodology described below is intended to identify wetland characteristics that provide important water quality mitigation and stormwater management functions. The premise for this evaluation is that, in addition to their well-known value as natural habitats, wetlands provide important societal and environmental benefits to adjacent and downstream areas -- specifically the natural filtering and transforming of pollutants in runoff water, the stabilization of erosive shorelines and streambanks, and the reduction of flooding by storing stormwater. In identifying these wetland benefits, it should not be misconstrued that wetlands are intended to single-handedly mitigate the effects of upstream development and adjacent disturbances. Wetlands can provide the identified benefits in a sustainable fashion only if they are not overloaded. It is critical, in addition to preserving these natural functions of wetlands, that best management practices be applied to development activities to minimize their hydrologic and water quality impacts. In assessing water quality and stormwater functions, the evaluation methodology distinguishes three categories of wetlands. By their very nature, all wetlands provide some level of water quality and stormwater functions. As an initial step, this methodology identifies wetlands that provide more substantial benefits and designates these as "significant value" wetlands. The methodology next identifies those wetlands that provide "high functional value." Such wetlands are considered to be particularly important because of their position within the landscape or watershed and/or their size. By distinguishing between different levels of wetland functional value, more effective strategies for wetland protection can be designed and implemented.

2. Determining High Functional Value Wetlands

High functional value is intended to indicate that a wetland provides exceptionally important benefits or functions worthy of extraordinary protection and management considerations. As previously discussed, high habitat value wetlands generally are considered irreplaceable and unmitigatable. Irreplaceability is generally more difficult to claim for most water quality and stormwater storage functions, however. It has been demonstrated that with proper site selection, design, and long-term management these functions often can be replaced, and even enhanced. A notable example is the documented sediment and nutrient removal in restored and created wetlands at the Des Plaines River Wetlands Demonstration Project in Lake County. Consequently, the high functional value designation for water quality and stormwater control functions is not equivalent to the "high habitat value" designation for habitat functions. The following procedure was utilized for determining high functional value for water quality and stormwater functions. If a wetland met either of the following conditions it was considered a high functional value wetland.

Condition 1: Three Out of Four Significant Functions Met

The existence of a combination of significant water quality and stormwater functions in an individual wetland generally is indicative of greater value than if only one significant function is present. Further, replacement of multiple functions is generally more difficult than replacing an individual function. For example, stormwater storage value is principally related to the size and outlet characteristics of the wetland, whereas effective nutrient removal also requires the presence of appropriate wetland soils and vegetation. Based on these considerations, a wetland was considered to have high functional value if it met the "significant value" criteria for three of a possible four water quality and stormwater storage functions. This approach is consistent with the methodology utilized for the Lake and McHenry County ADID projects. If a wetland qualified as a high functional value wetland under condition 1, then condition 2 did not need to be checked. Otherwise, condition 2 was evaluated for any wetland that met the "significant value" criterion for any one of the four water quality or stormwater functions, as described below.

Condition 2: High Value for a Single Function

If it can be shown that any one function is critical due to a wetland's size or its location in the landscape with respect to downstream or adjacent resources, this wetland should be considered to have high functional value. A wetland's place in the landscape, or a watershed, often is critical to establishing its value in providing certain functions. For example, stormwater storage and flow dissipation functions are critical to prevent hydrologic destabilization and erosion in downstream channels. If a wetland which provides this function is destroyed and replaced at some other location, even in the same watershed, these benefits may be substantially reduced or lost and the local resource will be impaired. Further, the timing of mitigation is critical. A created wetland may take an extended period of time to reach a high level of performance, particularly for functions such as nutrient removal which depend on the presence of an abundant wetland plant community. In the interim between destruction of the original wetland function and replacement of this function in a mitigation wetland, considerable environmental damage may result.

To assess condition 2, additional criteria have been established for each water quality and stormwater storage function. These criteria establish a wetland's value with respect to its position in the landscape or watershed, and/or its size. These criteria are used to elevate a wetland to the high functional value category after it first meets the basic criteria for significant value for one or more individual functions. Because this methodology considers the location of a wetland with respect to downstream or adjacent high quality habitats, procedurally this required that water quality functions were evaluated after habitat function determinations were completed. Further, if a particular wetland was determined to be a high habitat value, no further assessment was done to verify whether it may have been of high functional value for water quality or stormwater functions. The rationale for this decision considered the limited project resources and the fact that high habitat value was the highest designation possible and would afford the highest level of protection.

3. Overview of Water Quality Mitigation Functions

Wetlands are widely known to provide valuable water quality mitigation functions that protect adjacent or downstream waterbodies. Based on a review of several references, particularly the Wetland Evaluation Technique (WET) manual (Adamus et al., 1987), the Oregon Method (Roth et al., 1993), and the Minnesota manual (U.S. Army Corps of Engineers, 1988), several water quality mitigation functions are considered to be important in Kane County. These functions include the ability of wetlands to provide for:

- shoreline and streambank stabilization,
- sediment and toxicant retention, and
- nutrient removal and transformation.

Other water quality mitigation functions of wetlands, such as the protection of groundwater recharge areas, were considered for evaluation. However, it was concluded that these evaluations generally would require detailed site-specific data, beyond the capabilities of this ADID project, for accurate assessments to be performed.

The evaluation and quantification of the selected functions in individual wetlands can be very complex and the referenced methodologies describe fairly elaborate approaches to perform thorough evaluations. However, because of the large number of wetlands to be considered, it was necessary to adopt a simpler evaluation procedure. The approach described in this report and endorsed by the ADID TAC involves an integrated procedure incorporating GIS screening; aerial photo/map evaluation; and field evaluation, as needed. Due to project budgetary constraints, field evaluation was done only for wetlands that were determined to meet preliminary criteria for high functional value for the shoreline and streambank stabilization function. Wetlands that met preliminary criteria for high value for this function were field checked because it was not possible to effectively assess the presence or absence of stabilizing vegetation and stable conditions using aerial photography and/or 2-foot topographical map layers.

E. Shoreline/Streambank Stabilization

This function is derived from the WET function of "sediment stabilization" which is defined as the ability to bind soil and dissipate erosive forces (Adamus et al., 1987). This function is similar to the "shoreline anchoring" function described in the Minnesota Wetland Evaluation Methodology (U.S. Army Corps of Engineers, 1988). Shoreline/streambank stabilization is provided by wetland vegetation along the shore of a lake or the bank of a stream or river. Stabilization prevents the erosion of the shore or bank and also stabilizes accumulated bottom sediments. Stabilization is provided both by the soil-binding capability of the root system as well as the capacity of erect, emergent, or floating-leaved vegetation to dissipate the erosive forces of waves or currents.

1. Significant Value Determination

The first step is to determine whether a given wetland has a significant opportunity to perform shoreline or bank stabilization. This opportunity is based on the presence of potentially erosive forces in an erodible environment. The recommended method is adapted from WET. It is assumed that there is a significant potential to perform the function of shoreline/streambank stabilization if there is the presence of flowing water, such as in a perennial stream, or there is open water, as in a lake or pond. The presence of open water was determined by screening for open water at least 2.5 acres in size using the ADID open water layer. The selection of a minimum open water size of 2.5 acres was based on the need for shoreline stabilization. It is assumed that very small, non-flowing water bodies (e.g., smaller than 2.5 acres) will be less susceptible to shoreline erosion due to minimal opportunity for wave buildup. Therefore the opportunity, or need, for shoreline stabilization is low. Screening to determine adjacency (i.e., touching) between a wetland and a mapped stream or open waterbody was implemented by querying the GIS and through visual inspection since there are some horizontal accuracy limitations of the GIS databases used for this project. In addition to checking for adjacency to streams or waterbodies, it was determined that the presence of stabilizing wetland vegetation must occur for a length of at least 500 feet along a streambank or lake shore in order for the wetland to qualify for a "significant" function. This determination was made by reviewing aerial photography.

Effectiveness in performing shoreline and bank stabilization is a function of the width of stabilizing vegetation present. The selected methodology adopted a width of at least 50 feet for stream and lake shoreline environments. WET indicates that one of the following vegetation conditions must be present for this function to be supported at a high level: presence of erect vegetation (greater than 20 foot width), presence of forest or scrub-shrub, or good water and vegetation interspersion. It indicates that riverine and contiguous palustrine wetlands will never be rated low by these criteria and that most palustrine wetlands with some open water will be rated high. An initial evaluation of effectiveness based on vegetation width was performed using aerial photos. Certain types of wetland environments, including artificial excavated ponds with steep sides (e.g., detention basins), and channelized or artificially armored stream channels, were immediately excluded from further consideration based on review of aerials. In most cases these types of "man-made" environments won't have riparian wetland vegetation and even if riparian wetlands are present it is likely that the waterbody could benefit from restorative modifications. Aerial photo interpretation also was used to detect the presence of obvious Reed Canary Grass borders. If shallow-rooted Reed Canary Grass is prevalent in a riparian zone, field experience indicates that shoreline stabilization is problematic. Reed Canary Grass is readily detectable as a light-colored monotone on aerials made in dormant seasons. Further, if during aerial photo interpretation it was clear that canopy cover was more than 50% and the ground surface could not be seen, then the vegetation was not considered to be stabilizing because it seemed unlikely that much stabilizing herbaceous cover could be growing beneath the canopy. If the stream or waterbody was flanked by a wetland on one side and a road on the other side, the vegetation was also not considered to be stabilizing. This is because at best only one side of the stream was stabilized while the other side was likely to be disturbed and unstable.

2. High Functional Value Determination

A wetland was determined to provide high functional value if it met the significant value criteria described above and it bordered a high quality stream or a stream reach with high quality reaches downstream. The rationale for this approach is that high quality stream habitats are highly dependent on stable, non-eroding shoreline/streambank environments. Therefore, the sustainability of these habitats is greatly enhanced if stabilizing riparian wetlands are present. The determination of wetland adjacency to a high quality stream or to a lake was determined using the GIS as a screen, as described previously. Information about what Kane County streams had high quality segments downstream (either within the county or outside of the county) was supplied by IDNR fisheries biologists based on IBI scores. Field checking was performed to verify the characteristics of potential high functional value wetlands. Field checking for this function was used principally to verify that vegetatively stabilized conditions were actually present. The field check verified whether the bank or shoreline was experiencing excessive erosion, and whether the riparian wetland plant community consisted of species likely to provide long-term soil stabilization. Field evaluation was particularly important in identifying situations where the streambank or lake shore may have been vegetated by undesirable, invasive species that were not providing effective stabilization. For example, there are several common trees and shrubs which shade out understory vegetation, resulting in barren soil during the nongrowing season. There also are grasses and groundcovers, such as Reed Canary Grass, that are shallow-rooted and generally are ineffective at stabilizing erosive streambanks and shorelines. Field evaluators considered the guidance of the DuPage County Department of Environmental Concerns which has identified the following plants as undesirable in riparian zones: Box Elder, Common and Glossy Buckthorn, Multiflora Rose, Tartarian Honeysuckle, Reed Canary Grass, and Garlic Mustard (Rust Environment and Infrastructure, 1995). If field checking indicated that the riparian plant community was dominated by undesirable non-natives, experience indicates that it would be unlikely that stabilized conditions exist and, therefore, it was assumed that the high functional value condition was not met. This methodology is summarized in the following flow chart and data sheet.

FIGURE 3. Shoreline/Streambank Stabilization Flow Chart

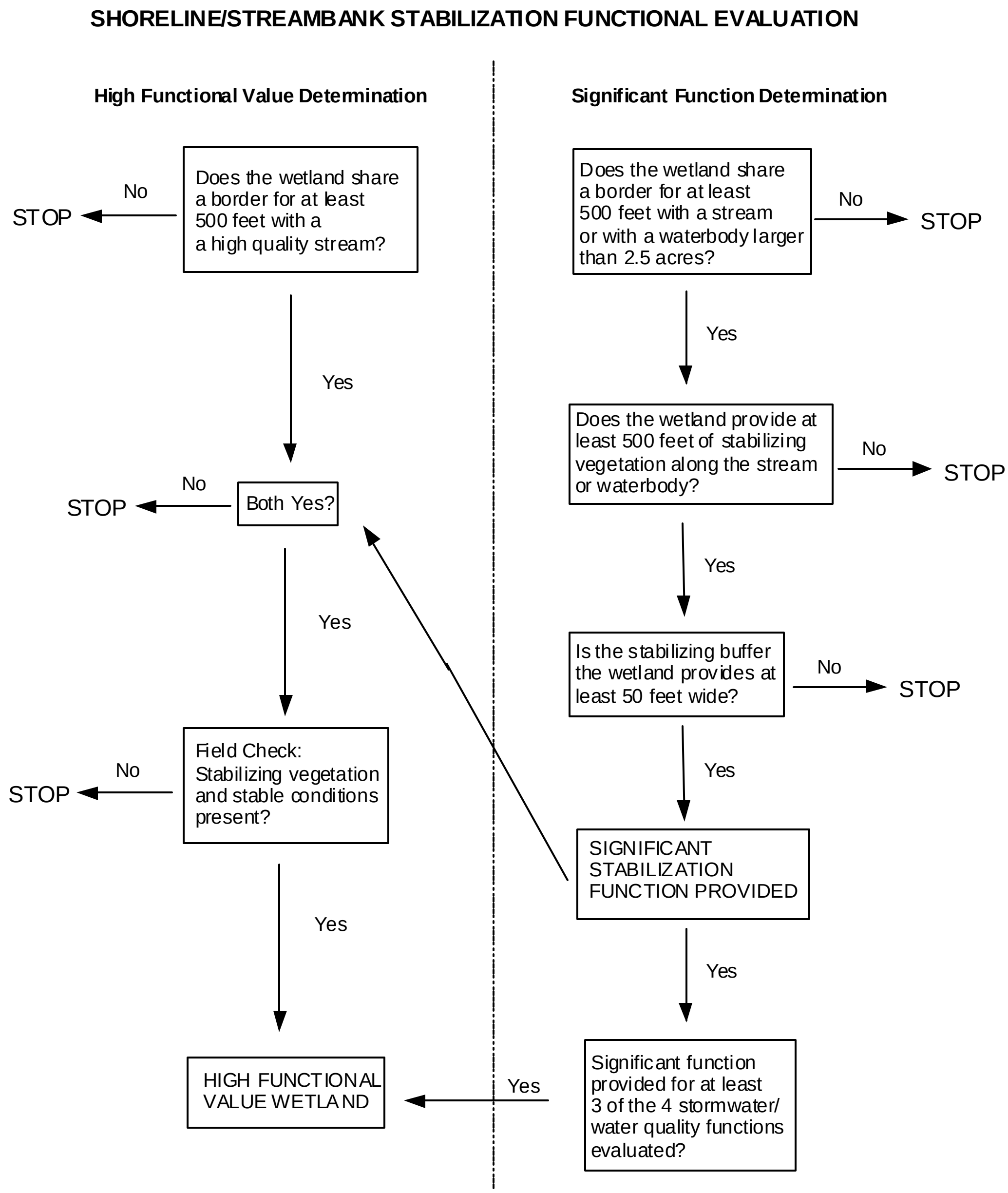


TABLE 5. Shoreline/Streambank Stabilization Data Sheet.

Shoreline/Streambank Stabilization Candidate: (potentially adjacent to open water or perennial stream based on GIS screen)

Map/Aerial Check:
1) Is wetland adjacent to an open water body or perennial stream (~7mi2 or larger watershed) for at least 500 feet:

based on GIS map? Yes No Unclear

If unclear, based on aerial photo? Yes No
(**If no, STOP)**

1a) Is wetland adjacent to high quality stream for at least 500 feet (for HQ determination):

based on GIS map? Yes No Unclear
If unclear, based on aerial photo? Yes No

2) If yes to #1, is the majority of the wetland buffer length vegetated in reed canary grass, based on aerial photo interpretation? Yes No

2a) If no to #2, does the majority of the wetland buffer have more than 50% canopy cover so that the ground surface could not be seen? Yes No

2b) If no to 2 and 2a, is the stream flanked on one side by a road? Yes No
(If yes to 2, 2a or 2b, STOP)

3) If no to #2, 2a and 2b, is the wetland buffer at least 50 ft. wide along lake shoreline or streambank? (from aerial photo)? Yes No
(If no to #3, STOP)

If yes to #3, a significant stabilization function is provided.

High Functional Value Determination: (potentially adjacent to a high quality stream based on GIS screen)

4) Is #3 (basic function) and #1a answered yes? Yes No
(If no, STOP)

If yes, then a field check is needed.

Field Check:

5) If yes to #4, is the majority of the buffer length composed of erect vegetation, or forest of scrub-shrub, or good water and vegetation interspersion along lake or stream in a stable environment? Yes No

If yes to #5, a high value stabilization function is provided.

F. Sediment/Toxicant Retention

WET defines this function as the ability to trap or retain on a net annual basis inorganic sediments and/or chemical substances generally toxic to aquatic life. Wetlands are widely noted for their ability to perform this function. The value of an individual wetland in performing sediment/toxicant retention is related to its size and other physical characteristics as well as the presence of potential contaminant sources upstream. Sediment/toxicant retention involves primarily physical, but also chemical and biological, mechanisms. Water entering a wetland, either as stormwater runoff or as streamflow, generally slows due to ponding. Particles in the water have an opportunity to settle due to slower velocities and the trapping effects of wetland vegetation. Trapped sediments, often contaminated with toxicants such as heavy metals, are then subject to biological processes such as plant uptake. The sediments also may be altered chemically, resulting in the immobilization of constituents, or conversion to less toxic forms.

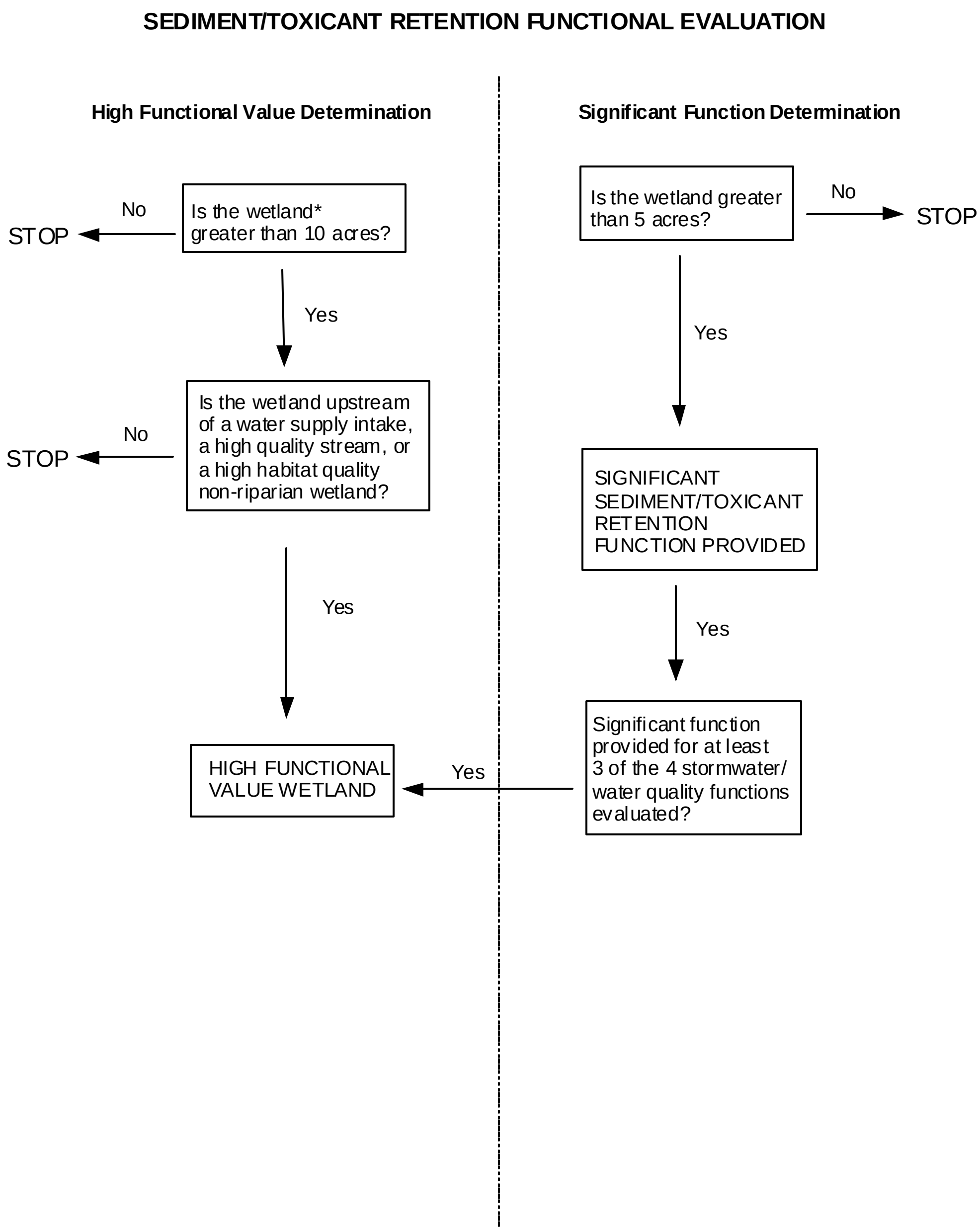
1. Significant Value Determination

The procedure for evaluating wetlands for the sediment/toxicant retention function started with a screening step. All other things being equal, it is arguable that a large wetland is more valuable than a small wetland in providing this function because it is capable of retaining a greater quantity of sediment and toxicants. Considering this factor, and the large number of wetlands in the county, wetlands smaller than 5 acres were not further evaluated for this function. The next step in the methodology was an evaluation of the opportunity to perform the function of sediment/toxicant retention. It is assumed in this methodology, as in WET, that there is a high opportunity for sediment/toxicant retention if the upstream watershed contains significant nonpoint and/or point sources of sediment or toxicants. Examples of sources include row crops, construction activities, commercial developments, and wastewater discharges. These types of conditions are almost always present in Kane County wetland watersheds.

2. High Functional Value Determination

A wetland was determined to provide high functional value if it was greater than 10 acres in size and upstream of a high quality stream, high habitat value non-riparian wetland, or a water supply intake. The rationale for this approach is that high habitat quality streams and high habitat value wetlands are dependent on clear, uncontaminated water sources, as is our water supply. Therefore, upstream wetlands that provide a sediment/toxicant retention function are, cumulatively, critical to the protection of these highly valued resources. The "non-riparian" distinction was made for high habitat value wetlands based on the argument that riparian wetlands (e.g., in a floodplain) would receive less benefit than depressional wetlands. The rationale is that depressional wetlands routinely receive surface runoff from upstream sources whereas riparian wetlands generally receive surface flow only during flood conditions. Therefore, they would benefit less from upstream wetlands providing this function. The use of a 10 acre cutoff size (versus a 5 acre cutoff) was intended to further distinguish significant functions from highly valued functions. 2-foot topographical contours and a 301 foot resolution digital elevation model were used to determine upstream/downstream relationships. Since there is a water supply intake on the Fox River in Aurora Township, this methodology resulted in most wetlands 10 acres or greater in the Fox River watershed qualifying as high functional value. Experience from the McHenry County ADID indicated that almost all wetlands qualifying for this function from the GIS screen were performing this function when field checked for verification that the wetland had no defined low-flow outlet, a constricted outlet, or was impounded or that the wetland was vegetated with erect, persistent vegetation in a depositional environment; or there was actual evidence of sediment accretion. For this reason, results from the GIS screen were used to assign high functional value to these wetlands in Kane County, without aerial photo interpretation or field evaluation. This methodology is summarized in the following flow chart and data sheet.

FIGURE 4. Sediment/Toxicant Retention Flow Chart.



*Artificial ponds can meet this criterion

TABLE 6. Sediment/Toxicant Retention Data Sheet.

Sediment/Toxicant Retention Candidate: (GIS screen determines that W wetland is > 5 acres)

A significant sediment/toxicant retention function is assumed to be provided.
High Functional Value Determination: (wetland is > 10 acres based on GIS screen)

Map Evaluation:

1) Is the wetland upstream of a high quality stream, a high habitat value non-riparian wetland, or a water suppy intake?:

based on GIS map layers? Yes No

(If no, STOP, if yes, high functional value wetland)

G. Nutrient Removal/Transformation

WET defines nutrient removal/transformation as the retention or transformation of inorganic phosphorus and/or nitrogen into their organic forms, or the transformation of nitrogen into its gaseous form, on either a net annual basis or during the growing season. This function is similar in many respects to sediment/toxicant retention. However, while sediment/toxicant retention is considered to be of substantial value to all downstream waterbodies and wetlands, nutrient removal/transformation is assumed to be of particular value in Kane County only if the wetland in question is upstream or adjacent to a lake, impoundment, or a high habitat value wetland. This distinction is made because of the serious eutrophication effects of excess nutrients on impounded waters. High nutrient loading also has been associated with reduced diversity in wetland plant communities and the predominance of less desirable species. The impact of nutrients on flowing waters is less significant due to a lower propensity to develop problems related to excess vegetation, particularly algae. This is due, in part, to the flushing effects of flowing water.

1. Significant Value Determination

The procedure for evaluating wetlands relative to this function started with a GIS screening step to eliminate from further evaluation all wetlands smaller than 5 acres. All other things being equal, it is arguable that a large wetland is more valuable than a small wetland in providing this function because it is capable of removing or transforming a greater quantity of nutrients. By eliminating all wetlands smaller than 5 acres from consideration, a more manageable number could be evaluated in greater detail. The appropriateness of a 5 acre cutoff was documented in the discussion of the sediment/toxicant retention function. The second step in this evaluation was a determination of the opportunity of a wetland to perform the nutrient removal/transformation function to a significant degree. The McHenry County ADID methodology included an initial check to determine that the wetland was in either the palustrine or riverine category. However, since all known lakes in Kane County are part of a palustrine (large marsh) system or are man-made or significantly modified, there were no wetlands captured in the Kane ADID database that were considered strictly lacustrine so this screening step was not necessary to the Kane County ADID. The rationale for excluding strictly lacustrine wetlands was that lacustrine wetlands primarily transform or recycle nutrients internally within the lake, thereby providing relatively little nutrient removal benefit. Palustrine wetlands which extend beyond the periphery of a lake, on the other hand, may be very effective in controlling the input of nutrients and their related adverse impacts on a lake. Opportunity to remove or transform nutrients also is judged on the basis of the presence of potential point or nonpoint sources of nutrients in the upstream watershed, as recommended in WET. Just as for sediment and toxicants, it is assumed that virtually all wetlands in Kane County lie downstream of significant potential nutrient sources. Another criterion used to judge whether there was significant opportunity, or benefit, for nutrient removal/transformation was the presence of a lake/impoundment or high quality habitat wetland downstream of the wetland that would benefit from this function. The definition of a lake or impoundment was based on the Illinois Department of Natural Resources criterion of a waterbody at least six acres in size. Waterbodies less than six acres are defined as ponds. It also was necessary to show that the wetland was hydrologically connected and upstream of the lake or high biological function wetland. Hydrologic connection was determined by checking mapped surface water features from the GIS maps along with 2 foot contours, watershed boundaries and a digital elevation model. Wetlands meeting these criteria were marked for significant functional value for the nutrient removal/transformation function.

2. High Functional Value Determination

A wetland was determined to provide high functional value for nutrient removal if it met the preceding criteria and was upstream of a high habitat value non-riparian wetland and was larger than 10 acres in size. The rationale for these criteria begins with the understanding that wetlands supporting high quality habitats are highly dependent on upstream water sources that are relatively low in nutrient content (i.e., to avoid eutrophication and to preserve floristic quality). Therefore, upstream wetlands that provide a significant nutrient removal/transformation function are, cumulatively, critical to the protection of these high habitat value sites. The proximity of the upstream wetland to a high habitat value wetland is not that important due to the relatively short flow times which exist at the watershed scales found in Kane County (typically less than one day between any upstream wetland and a downstream wetland). The use of a 10 acre cutoff size (versus a 5 acre cutoff) was intended to further distinguish significant functions from highly valued functions. Aerial photography interpretation which included use of 2 foot topographical contours and soils layers, was performed to verify high functional value wetlands. The photo interpretation considered the following criteria: a wetland should have no outlet, a constricted outlet, or be impounded, or it should be vegetated with woody, floating-leaved, or persistent emergent vegetation in a low velocity environment. This methodology is summarized in the following flow chart and data sheet.

FIGURE 5. Nutrient Removal/Transformation Flow Chart.

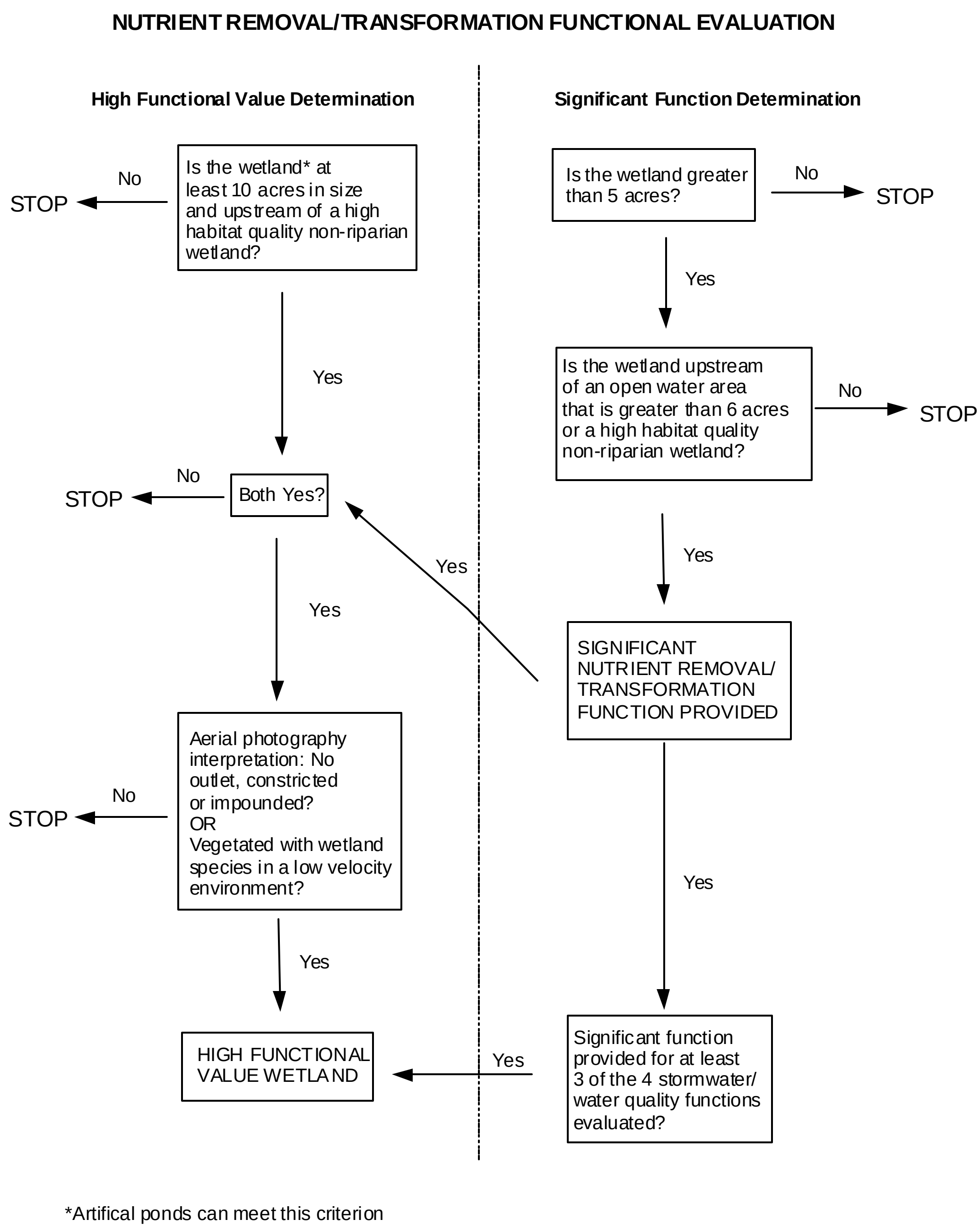


TABLE 7. Nutrient Removal/Transformation Data Sheet.

Nutrient Removal/Transformation Candidate: (GIS screen determines that wetland is > 5 acres)

Map Evaluation:

1) Is wetland upstream of a lake/impoundment (> 6 acres) or high habitat value non-riparian wetland

based on GIS layers (including 2 foot topo and digital elevation model)? Yes No

(If no, STOP)

If yes, a significant nutrient removal/transformation function is provided.

High Functional Value Deter mination: (wetland is > 10 acres based on GIS screen)

1a) Is the wetland upstream of a high habitat value non-riparian wetland based on digital elevation model and 2 foot topo (for HQ determination, see below)?
Yes No

(If no, STOP)

If yes, then aerial photography interpretation is needed.

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Photo interpretation:

2) If yes to #1a, does wetland meet either of the following conditions:
a) No outlet, constricted outlet, or impounded? Yes No
b) Vegetated with woody, floating leaved, or persistent emergent vegetation in a low velocity environment? Yes No
(If no to both, STOP)

If yes to either #2a or #2b, a high value nutrient removal function is provided.

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H. Stormwater Storage/Hydrologic Stabilization Function

1. Background

The value of wetlands for controlling flooding and stabilizing streamflows is widely recognized. Wetlands serve as natural water storage areas during periods of high runoff and streamflow. Riparian or floodplain wetlands temporarily store runoff, reducing peak streamflows. Depressional wetlands typically hold runoff for longer periods of time as water slowly discharges through constricted outlets, infiltrates into the ground, and evaporates. By altering the timing and total volume of runoff, such wetlands can dramatically reduce flood flows, stabilize flow variations, and supplement baseflows in receiving streams. Certain functions of stormwater storage in wetlands are replaceable in the sense that storage volume in one location can be reproduced by excavation or impoundment in another location. However, certain stormwater functions may be more difficult to replace. The location of the storage, for example, is critical. Wetland storage immediately upstream of a developed area is more valuable for flood prevention than a similar quantity of storage downstream of the development. The nature of stormwater storage in wetlands, particularly as it relates to the complex interrelationships between evaporation, groundwater recharge and discharge, and surface outflow, also is critical because it affects both hydrologic (e.g., runoff volume and timing) and hydraulic (e.g., runoff rate) functions. In particular, organic wetland soils have been shown to literally soak up runoff water and release it slowly over time. For these reasons, wetland storage typically cannot be effectively replaced with simple manmade structures, such as stormwater detention basins, that are designed to deal with only hydraulic functions.

2. Significant Value Determination

The determination of whether a wetland provides a significant stormwater storage function considered the wetland area, location of the wetland relative to regulatory floodplains, and its potential to retain stormwater. The assessment procedure for these factors is described below. The area of a wetland is a good indicator of the relative storage volume of the wetland. In general, the larger the area of the wetland the more runoff it will be able to store, infiltrate, and evaporate. Consistent with the rationale presented for the sediment removal and nutrient transformation functions, all wetlands smaller than five acres were excluded from further consideration for the significant value determination for stormwater storage. The five acre determination was made using the GIS as a screening tool. It was assumed that most wetlands which fall primarily within a regulatory, riverine floodplain are freely drained to a stream or other waterbody. Since such wetlands only temporarily store runoff during runoff events, it was argued that their storage generally is not as beneficial as storage in non-riverine depressional wetlands. Depressional wetlands, as described above, retain water for longer periods of time and, thereby, tend to be more effective in preserving beneficial hydrologic conditions. Based on this reasoning, if at least 50 percent of the area of a wetland was within a regulatory, riverine floodplain (as identified on Federal Emergency Management Agency (FEMA) floodplain maps), it was be considered a floodplain wetland and was not considered further for the stormwater storage function. The determination of floodplain versus non-floodplain wetlands was made utilizing the GIS as a screening tool. However, because FEMA floodplains include some isolated, non-riverine depressions, additional checking of GIS maps was necessary to avoid excluding these depressions. The final step was to determine whether the wetland had significant potential to retain stormwater. The criteria for this determination were that the wetland lay in a depression with either no surface outlet or a constricted outlet, or the wetland was impounded. Based on a general familiarity with Kane County wetlands, it is known that most non-floodplain wetlands would meet this criterion. One known exception is hillside seeps (e.g., fens). Fens were identified during the habitat evaluation field work and since all fens discovered occurred within wetlands designated as high habitat value, these wetlands were not considered for functional values. Non-riparian depressions were identified using aerial photographs and 2-foot topographical contours.

3. High Functional Value Determination

It was concluded that it would be difficult to accurately determine the relative importance of individual stormwater storage wetlands in preventing localized flooding and stormwater drainage problems, unless in-depth, site specific evaluations were performed. Also, it was observed that there was considerable similarity between the functional assessment methodologies for sediment/toxicant retention and stormwater storage. As a consequence, the wetlands that would meet the high functional value criteria for sediment retention would include most of the previously identified stormwater storage wetlands. In consideration of these factors, it was concluded that a separate high functional value methodology would not be developed for the stormwater storage function. While a wetland could not meet the high functional value distinction for stormwater storage alone, it could be considered a high functional value wetland value if it provided significant values for three of the four water quality/stormwater functions (i.e., condition 1 as previously described). This methodology is summarized in the following flow chart and data sheet

FIGURE 6. Stormwater Storage/Hydrologic Stabilization Flow Chart.

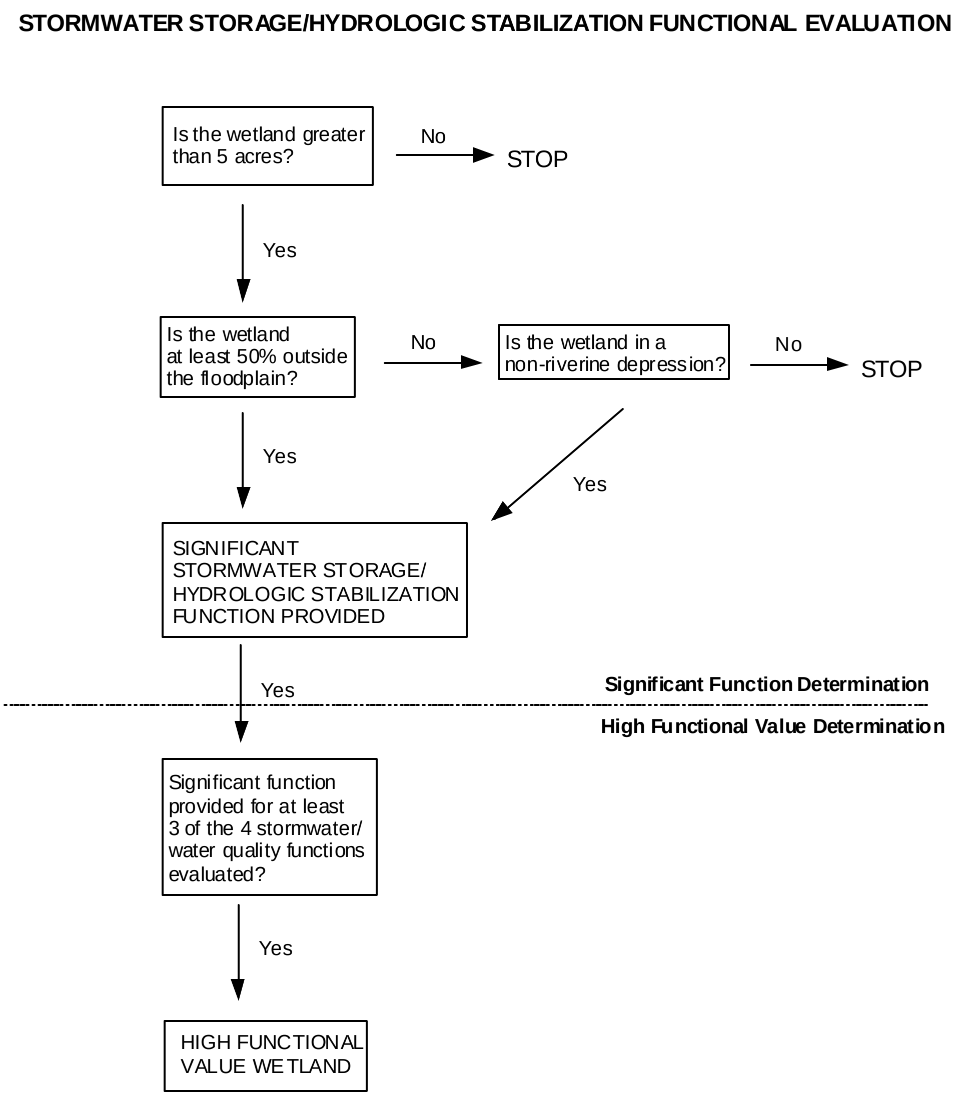

TABLE 8. Stormwater Storage/Hydrologic Stabilization Data Sheet.

Stormwater Storage/Hydrologic Stabilization Candidate: (GIS screen determines that wetland is > 5 acres and at least 50% outside floodplain)

1) Or if wetland is predominantly in floodplain, is wetland a non-riverine depression?
Yes No

If yes to GIS screen or #1, a significant stormwater storage/hydrologic stabilization function is provided.

IV. Evaluation Results

A. High Habitat Value Wetlands

During field work it was determined that 139 wetlands totaling 5,789 acres met the criteria for high habitat value. Thus, high habitat value wetlands comprise approximately 1.7% of the 334,080 acres that make up the entire area of Kane County, and approximately 21% of the county's 27,368 acres of wetland area. Most of the high habitat value wetlands tended to be fairly large parcels, averaging 42 acres in size in comparison to the average "w" wetland size of 11 acres. Approximately one third of the 5,789 acres of high habitat value wetlands are within Kane County Forest Preserve or Illinois Natural Area Inventory site boundaries.

B. High Quality Streams

Including the Fox River, 70.5 of a total 418 stream miles in Kane County , or 17%, were designated high quality. High quality stream segments were found on several different named streams and rivers scattered throughout the county including Big Rock Creek, East Branch Big Rock Creek, Blackberry Creek, Ferson/Otter Creek, the Fox River, Mill Creek, Poplar Creek, Tyler Creek, Waubonsie Creek, Welch Creek, Burlington Creek, and Union Ditch #3. Considering the Fox River only, 17.6 of the total 37.4 miles within Kane County , or 47% were designated as high quality. Excluding the Fox River, 52.9 miles of the total 380.6 miles of stream in the county, or 14%, were designated as high quality. A breakdown of Biological Stream Characterization (BSC) Ratings appears below:

Fox River

Quality Designation	**Miles of River**
High Quality (BSC = A or B or a threatened and endangered species is present)	17.6
Fair Quality (BSC = C)	9.2
Poor Quality (BSC = D)	10.6
Very Poor Quality (BSC = E)	0
Unrated	0
TOTAL FOX RIVER MILES IN KANE COUNTY	37.4

All other Streams

Quality Designation	Miles of Stream
High Quality (BSC = A or B or a threatened and endangered species is present	52.9
Fair Quality (BSC = C)	35.9
Poor Qualtiy (BSC = D)	19.1
Very Poor Quality (BSC = E)	0.7
Unrated	272
TOTAL STREAM MILES (EXCLUDING THE FOX RIVER) IN KANE COUNTY	380.6

C. High Functional Value Wetlands

A total of 372 wetlands, comprising 10,745 acres, met the criteria for high value for stormwater and water quality functions. Thus, wetlands of high value for these functions comprise approximately 3.2% of the 334,080 acres that make up the entire area of Kane County, and approximately 39% of the county's 27,368 acres of wetland area. The average size of 29 acres for high functional value wetlands was nearly three times larger than the average (code "w") wetland size.

D. Summary

The total acreage of wetlands designated as high value (including high habitat value and high value for stormwater and water quality functions) is 16,533. This makes up approximately 5% of Kane County's entire area and represents 60% of the total wetland acreage in the county.

References

Adamus et al. 1987. Wetland Evaluation Technique (WET). Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, Mississippi.

Becker, G. C. 1983. The Fishes of Wisconsin. University of Wisconsin Press. Madison, Wisconsin.

Bouffaard, S. H. 1982. Wildlife values versus human recreation: Ruby Lake National Wildlife Refuge. Transactions of the North American Wildlife and Natural Resources Conference 47:553-558.

Brown, M. and J. Dinsmore. 1986. Implications of marsh size and isolation for marsh bird management. Journal of Wildlife Management 50(3):392-397.

Brewster Creek Biological Survey, Illinois Department of Natural Resources Division of Fisheries, September 1998.

Butts, T. A. and R. L. Evans. 1978. Effects of channel dams on dissolved oxygen concentrations in northeastern Illinois streams. Illinois State Water Survey Circular 132.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Fish and Wildlife Service.

Dreher, D., S. Elston, and C. Schaal. 1992. Advanced identification (ADID) study, Lake County, Illinois. for U.S. Environmental Protection Agency, Region 5.

Ferson/Otter Creek Biological Survey, Illinois Department of Natural Resources Division Of Fisheries, September 1998.

Garrad, P. N. and R. D. Hey. 1988. River management to reduce turbidity in navigable Broadland rivers. Journal of Environmental Management 27:273-288.

Golet, F. C. 1976. Wildlife wetland evaluation model. *In* Larson, J. S. ed., Models for assessment of freshwater wetlands. University of Massachusetts Water Resources Research Center, Amherst, MA.

IEPA. 1989. Biological stream characterization (BSC): a biological assessment of Illinois stream quality. Special report 13 of the Illinois State Water Plan Task Force. Illinois Environmental Protection Agency.

Karr, J. R. 1981. Assessment of biotic integrity using fish communities. Fisheries 6(6):21-27.

Karr, J. R., K. D. Fausch, P. L. Angermeier, P. R. Yant, and I. J. Schlosser. 1986. Assessing biological integrity in running waters: a method and its rationale. Illinois Natural History Survey Special Publication 5.

Larson, Larry A. 1987. Wetlands and Flooding: Assessing Hydrologic Functions. In Jon A. Kusler and Gail Brooks eds. Proceedings: National Wetland Symposium Wetland Hydrology. Association of State Wetland Managers. Berne, New York.

Liddle, M. J. and H. R. A. Scorgie. 1980. The effects of recreation on freshwater plants and animals: a review. Biological Conservation 17:183-206.

Pescitelli, S.M., and R.C. Rung. 2000. Biological Survey of Little Rock Creek (Fox River Basin) Kane/Kendall Counties, Illinois, Illinois Department of Natural Resources Division of Fisheries, September 2000.

Robins, C. R., R. M. Bailey, C.E. Bond, J.R. Brooker, E.A. Lachner, R.N. Lea, and W.B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. American Fisheries Society Special Publication 20.

Roth, E., R. Olsen, P. Snow, R. Sumner. 1993. Oregon Freshwater Wetland Assessment Methodology. Oregon Division of State Lands. Rust Environment and Infrastructure. Stream Stabilization Program. Prepared for DuPage County Department of Environmental Concerns. 1995.

Rung , R.C., and S. M. Pescitelli. 1997. Blackberry Creek 1997 Biological Survey, Illinois Department of Natural Resources Division of Fisheries.

Rung, R.C., and S. M. Pescitelli. 1997. Waubonsie Creek 1997 Biological Survey, Illinois Department of Natural Resources Division of Fisheries.

Santucci, V.J., and Gephard, S.R. 2003. Fox River Fish Passage Feasibility Study. Final Report Submitted to Illinois Department of Natural Resources, C2000 Ecosystem Program. Max McGraw Wildlife Foundation. Dundee, Illinois.

Simon et al. 1987. Evaluating Wetlands for Flood Storage. In Jon A. Kusler and Gail Brooks eds. Proceedings: National Wetland Symposium Wetland Hydrology. Association of State Wetland Managers. Berne, New York.

Smith, P.W. 1979. The fishes of Illinois. University of Illinois Press. Urbana, Illinois
U.S. Army Corps of Engineers, St. Paul District. 1988. The Minnesota Wetland Evaluation Methodology for the North Central United States.

Smogor, R. 2000. Draft Manual for Calculating Index of Biotic Integrity Scores for Streams in Illinois.

Summary Of Fish Community Surveys, Tyler Creek, (Fox River Basin), Kane County, Illinois, Illinois Department of Natural Resources Division of Fisheries, no date.

Weller, M. 1981. Freshwater marshes, ecology and wildlife management. University of Minnesota Press, Minneapolis, MN.

White, J. 1978. Illinois natural areas inventory technical report, volume 1, survey methods and results. Illinois Natural Areas Inventory, Urbana, IL.

U. S. Army Corps of Engineers, St. Paul District. 1988. The Minnesota wetland evaluation methodology for the north central United States.