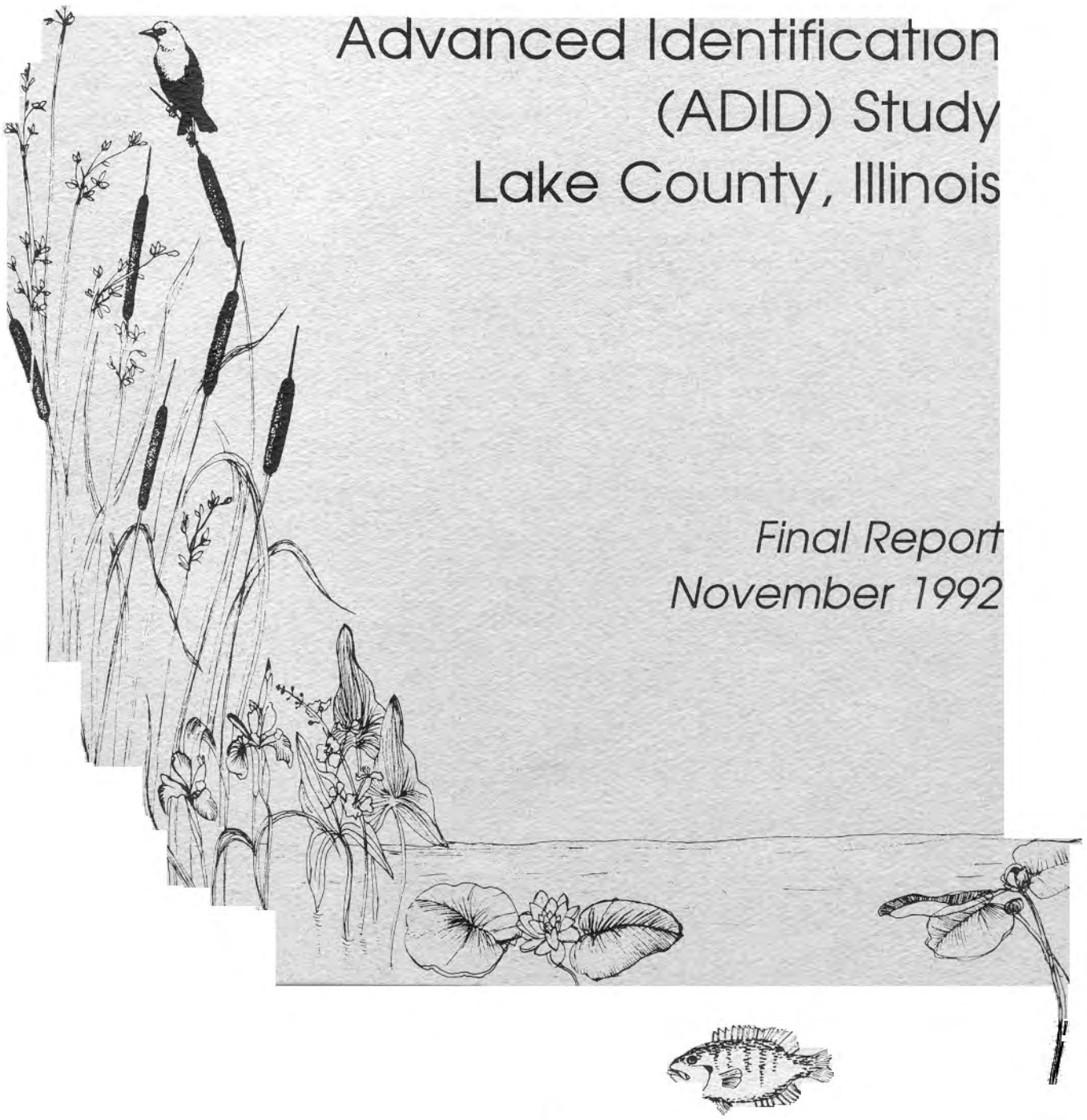
Advanced Identification (ADID) Study Lake County, Illinois

Final Report
November 1992



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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. A designation of unsuitability does let 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.

In general, the 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. It is important to emphasize that the Lake County ADID attempted to identify wetlands of exceptionally high functional value. These sites were determined to be unsuitable for filling activities based on consideration of the 404 (b)(1) Guidelines. It is important to note that no determination regarding suitability/unsuitability has been made for any of the wetlands not identified in this study.

Historically, wetland protection measures in Lake County have included federal regulations, several local government ordinances, and acquisitions by government agencies, primarily the Lake County Forest Preserve District and the Illinois Department of Conservation. However, with the rapid pace of urban development in the last several decades, unacceptable losses of wetland functions 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 quality 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 in Lake County

Lake County possesses an abundance of wetland types in a variety of physical settings. Predominant wetland types include palustrine, lacustrine, and riverine systems. Palustrine wetlands are found in a wide variety of geographic settings and terrains in Lake County and include marshes, bogs, fens, wet prairies, forested wetlands, and ponds. Lacustrine wetlands

are very common, as implied by the county's name, and are exemplified by the expansive wetlands of the Chain O' Lakes - Fox River. Riverine wetlands also are common with the largest expanses occurring along the Fox and DesPlaines rivers.

The National Wetland Inventory (NWI) identifies approximately 41,000 acres of wetland in the county, representing nearly 14 percent of the total land area. For comparison, the Lake County Forest Preserve District has estimated, based on interpretations of pre-settlement vegetation descriptions on Federal Land Survey maps, that Lake County may have had in excess of 48,000 acres of wetland prior to man induced disturbances. While it is difficult to directly compare present wetland acreage to pre-settlement figures because of differences in methodology, it is clear that substantial areas of wetland have been lost and that most remaining wetlands have been degraded. The Lake County Health Department has estimated that only five percent of the county's wetlands are pristine, having never been plowed, grazed, or otherwise damaged. Historically, probably the most significant cause of wetland degradation in the county was draining 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 offer considerable benefits to the residents of Lake County. To the casual observer, wetland areas enhance natural aesthetics and serve as buffers between adjacent developments. Wetlands 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.

C. Related Activities

This ADID project, which was initiated in October 1989, expands upon an abbreviated ADID which was completed in 1985. The present project, while incorporating the list of sites developed in the 1985 study, was able to utilize the National Wetland Inventory (NWI) and the Lake County Wetland Inventory (LCWI), both available on the county's geographic information system (GIS) database, as well as updated aerial photography.

Wetlands protection is a high priority for a number of local governments within the county. Presently, the following entities enforce some form of wetland regulation at the local level: Barrington Hills, Long Grove, Wauconda, and the County.

A comprehensive countywide stormwater management program has been initiated by the Lake County Stormwater Management Commission (SMC). The SMC has developed a comprehensive Watershed Development Ordinance which includes protection of the beneficial functions of wetlands. This ordinance explicitly references the protection of high functional quality wetlands as identified by the ADID project.

In response to a proposed highway extension through central Lake County, an intergovernmental group known as the Corridor Planning Council has been formed. Part of their mission is to

develop principles and standards to provide protection from development activities. Their draft standards explicitly address wetland protection, including special protection of ADID high quality wetlands.

Another related activity is the special area management planning (SAMP) project in the Chain O' Lakes - Fox River area. The SAMP project has identified wetland protection as one of the essential priorities of the Chain O' Lakes - Fox River area.

Finally, there have been recent efforts involving the SMC, the Lake County Homebuilders Association, the Open Lands Project, the Northeastern Illinois Planning Commission (NIPC), and the relevant federal wetlands agencies to initiate the establishment of a pilot wetlands mitigation bank. The results of the ADID evaluations should prove useful to the eventual implementation of a mitigation bank.

D. Procedure

The initial scope of work for the ADID project consisted of the following tasks:

1. Establish technical steering committee.
2. Obtain mapping of existing wetlands.
3. Collect background data.
4. Develop a screening strategy.
5. Develop a list of wetlands for field inspection.
6. Develop a wetland evaluation methodology.
7. Evaluate and map ADID sites.
8. Establish a wetland protection planning committee.
9. Develop a Lake County wetland protection strategy.
10. Document the ADID process.
11. Develop public education materials.

Technical Steering Committee

The project was initiated in October 1989 and a technical steering committee was soon formed. The steering committee consisted of the following invited agencies:

U.S. Environmental Protection Agency, Region V
U.S. Army Corps of Engineers
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of Agriculture, Soil Conservation Service
Illinois Department of Conservation, Division of Natural Heritage
Lake County Department of Planning, Zoning, and Environmental Quality
Lake County Stormwater Management Commission
Lake County Forest Preserve District
Lake County Department of Management Services
Lake County Health Department
Lake County Soil and Water Conservation District
Northeastern Illinois Planning Commission

In addition, several entities were invited to participate with the steering committee as ad hoc members. These included the following:

Morton Arboretum
Illinois Environmental Protection Agency
DuPage County Department of Environmental Concerns
DuPage County Forest Preserve District
Northern Illinois University, Department of Geography

Initially, steering committee members were asked to identify the goals and interests of their respective agencies. It was agreed that the ADID methodology should reflect the specific objectives and priorities of the agencies. 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, including mitigation banking.

There was considerable discussion regarding the determination of wetland functions and values. The steering committee recommended that the following factors be considered: location of a wetland within the watershed; proximity to major river systems; replaceability; wildlife habitat; water quality benefits; value for consumable fish; stormwater management benefits; and groundwater recharge potential. The steering committee also provided advice on the use of existing mapping products, particularly the Lake County geographic information system (GIS), for the wetland evaluation process.

At the second meeting of the steering committee in December 1989, subcommittees were formed to develop detailed evaluation criteria for wetland functions and values. It was agreed that the subcommittees should address habitat functions, stormwater storage functions, and water quality mitigation functions. Subsequently, the subcommittees functioned as working groups to develop and implement the ADID methodology while the steering committee was convened on a less frequent basis to review the work of the subcommittees.

II. Description of Wetland Evaluation Methodology

A. Background

The ADID program encourages local entities to tailor wetland evaluations so that functions of local importance are addressed. The basic rationale for determining high quality wetlands was that identified ADID wetlands should provide unusually high functional values deserving of extraordinary protection. Considering local conditions in Lake County, the technical steering committee recommended that wetland ADID evaluations be based on three general functional values: habitat quality, stormwater storage, and water quality mitigation. This section describes the rationale and methodology for evaluating Lake County wetlands relative to the listed functions.

The development of a methodology for identifying high functional quality wetlands in Lake County relied both on existing wetland evaluation methodologies and the technical expertise of members of the technical steering committee. Two subcommittees were established to develop and implement evaluation methodologies for the functions identified above. Stormwater storage and water quality mitigation functions were addressed jointly by one subcommittee and habitat quality was addressed by another subcommittee. Principal participants on the subcommittees included staff from the Lake County Departments of Planning, Management Services, and Health; the Lake County Stormwater Management Commission; the Lake County Forest Preserve District; the Soil Conservation Service; the Lake County Soil and Water Conservation District; the U.S. EPA; IDOC; and NIPC.

In considering evaluation methodologies, it immediately became apparent that the selected approach must be capable of dealing with a very large number of candidate wetlands. Some existing methodologies relying heavily on detailed field evaluation were therefore excluded from consideration. References which were relied on to a significant degree included the Wetland Evaluation Technique (WET) developed for the U.S. Army Corps of Engineers and the Federal Highway Administration (Adamus, 1987) and the Minnesota Wetland Evaluation Methodology developed by the U.S. Army Corps of Engineers, St. Paul District.

B. Wetland Data Base – Lake County Wetland Inventory

The Lake County ADID project benefitted greatly from the availability of wetland and water resources mapping information in digital format. The Lake County Department of Management Services maintains both the National Wetland Inventory (NWI) and the Lake County Wetland Inventory (LCWI) on its GIS. The GIS also contains mapping of surface water features (i.e., lakes and streams), major watershed boundaries, flood of record boundaries, FEMA floodplain boundaries, soil mapping units, and other natural resource information.

When the project began, the NWI was the only wetland inventory available in digital format. As a result, initial wetland evaluations were performed using the NWI base. However, in the spring of 1991 the LCWI became available on GIS. After study and discussion, it was determined that the LCWI provided a better indication of actual wetland locations. Several

factors led to this determination. First, the LCWI was initially based on the Soil Conservation Service (SCS) "Swampbuster" wetland inventory completed in 1989. The SCS inventory used 1988 vintage black and white photographs at a scale of 1 inch equals 660 feet as its base map. The NWI maps were based on photointerpretation of 1980 and 1981 color-infrared transparencies and were reproduced on USGS quadrangle maps at a scale of 1 inch equals 2000 feet.

Secondly, the LCWI utilized various materials to document the necessary criteria (i.e., hydric soil, hydrophytic vegetation and wetland hydrology) for identifying an area as a wetland. In Lake County, same-scale transparent overlays of soils maps, NWI maps and surface water features were produced by the GIS. In addition, seven years of low-level Agricultural Stabilization and Conservation Service (ASCS) aerial color slides were reviewed, as was 1987 high altitude color infrared photography.

Finally, it was reported by County SCS, SWCD, and private consultants that field determinations more closely matched the LCWI boundaries than the NWI boundaries. In general, comparisons indicated that LCWI delineated wetlands tended to be larger in extent than NWI wetlands. In light of the above, the LCWI, though still an offsite inventory, is likely to be more accurate and up-to-date than the NWI for Lake County.

The LCWI includes a range of mapped wetland and non-wetland categories, including artificial and farmed wetlands and urban converted wetlands. Because the identification of ***high quality*** wetlands is a primary purpose of ADID, it was determined that the working wetland maps should exclude from consideration all wetland categories which are obviously disturbed or converted. Therefore, the mapping base used for ADID evaluations includes only areas in the "Wetland" (or W) category of the LCWI.

The Department of Management Services produced wetland maps, as described above, for the entire county on a USGS 7.5 minute quadrangle basis. For ease in evaluating wetland functions, the GIS also was used to produce two overlay maps at the same scale as the wetland maps. One overlay contained surface water features, flood of record boundaries, and major watershed boundaries. The second overlay contained digitized FEMA floodplain/floodway boundaries. The use of these maps will be described in subsequent sections.

C. Evaluation Methodology for Biological Functions

Introduction

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 functions. In either case wetlands play an important role in providing habitat for a number of wildlife species. Wetlands also include many plant communities which have become rare since settlement times. Due to the fact that wetlands were generally unsuitable, or at least more costly to develop, for farming or other economic use, many of the remnants of pre-settlement plant communities are found in wetlands. Wetlands also provide habitat for a number of State threatened or endangered animal and plant species.

One of the goals of the Lake County ADID was to identify aquatic sites which are providing exceptional biological functional value. Any site determined to be of exceptional biological value was considered a High Functional Value wetland, and therefore deemed unsuitable for fill. In

addition to assessing biological values of wetlands, streams within the county were also assessed in terms of their biological value. Wetlands which met any one of the following criteria were considered to be of exceptional biological value.

1. Presence of a State threatened or endangered species. In order to meet this criteria a site must qualify as an element occurrence on the Illinois Department of Conservation (IDOC) Natural Heritage Data Base.

2. Site is designated as a natural area on IDOC's Illinois Natural Areas Inventory.

3. The site contains high quality wildlife habitat. A site was considered to provide high quality wildlife habitat if it contained hemi-marsh habitat (a 50% mixture of open water and emergent vegetation). This type of wetland usually supports a large diversity of wetland wildlife species, many of which are on the Illinois threatened or endangered species list.

4. The site contains high quality plant communities. Plant communities were considered to be of high quality if they were dominated by native plant assemblages which reflect pre-settlement conditions.

5. Presence of a stream or stream segment of high biological value. Site includes a stream or portion of a stream which is in a relatively undisturbed condition.

Identifying sites which met either of the first two criteria, presence of State threatened or endangered species or a designated Illinois Natural Area, involved identifying all sites which appeared on IDOC's Natural Heritage Data Base on IDOC's Natural Areas Inventory. Sites which met any of the three remaining criteria were identified using the biological value evaluation method developed by the habitat workgroup.

Evaluating wetland habitat quality ideally would involve a visit to every wetland. However, because of the large number of wetlands in Lake County, and limited time and resources available for this project, it was necessary to develop an evaluation methodology which would initially screen out wetlands which were unlikely to provide high quality habitat. The methodology developed by the habitat subcommittee was a two step process designed to quickly screen out highly disturbed wetland sites and then provide a method to further evaluate habitat quality in the remaining sites. The initial screening process involved reviewing 1"=200' aerial photos of Lake County and eliminating wetland sites which showed a high degree of disturbance such as extensive ditching or draining activities, excavation, or intrusion due to filling activities. The wetlands remaining were the sites most likely to be in a relatively undisturbed condition and were rated using a numerical scoring system designed to further evaluate habitat quality.

Ecological features which have significant influence on either plant communities or wildlife habitat quality and could be evaluated from aerial photos were assigned numerical values between 1 and 4, with 1 being the best score and 4 the lowest. Therefore, the lower the habitat score the more likely the site was providing exceptional biological value. The following seven factors were evaluated for each wetland.

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 tiled or ditched and effectively drained were more disturbed and received a poorer numerical score.

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 poorer score.

3. **Size:** Wetlands were divided into four size categories with the larger areas receiving the best scores. The larger a wetland the more likely it was that it contained either high quality plant communities or high quality wildlife habitat. Larger wetland sites have a higher likelihood of containing high quality plant communities due to the fact the 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).

4. **Physical Intrusions and Barriers:** Presence of either a physical intrusion, such as fill of some sort, or presence of a barrier, such as a road or railroad, indicated disturbance. Wetlands with these features received poorer scores than sites without intrusions.

5. **Surrounding Land Use:** Surrounding land use within 200 feet of each wetland was categorized as either natural vegetation, old field or pasture, farmed, or developed. The less disturbed the surrounding land, the less likely it is for the wetland to be disturbed. Natural or only slightly disturbed land uses such as wooded areas or old field provide good buffers from disturbance and also provide additional wildlife habitat. Wetlands adjacent to land uses such as urban/developed or agriculture received a poorer habitat score due to the fact that these land uses typically have an adverse effect on water quality and/or disturb wildlife.

6. **Habitat Structure:** Habitat structure was the most critical factor evaluated during this assessment. Habitat structure is an excellent indicator of wildlife habitat and plant community quality. 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 present. Therefore, habitat structure was evaluated for each function and the lowest value of the two was used in the scoring. Since habitat structure was considered the most important ecological feature evaluated, the numerical score for this feature was doubled before adding to the other ecological feature scores. Two subsets of habitat structure include vegetative interspersion and plant/open water ratio. These are described below.

Vegetative Interspersion: Wetlands in Lake County which have retained some degree of their pre-settlement character are often made up of several plant communities. These natural communities may include emergent marsh, wet prairie, sedge meadow, fens, bogs, springs and seeps, or forested communities. The presence of three or more of these communities is a good indicator of a high quality wetland plant community. For the purposes of our evaluation we used a variation of the vegetative interspersion categories described in the Minnesota Wetland Evaluation Methodology (MWET) manual (COE, 1988) to identify high quality areas. The three interspersion categories from MWET were used. However, the plant communities identified were the natural communities listed above, which are native to the study area. Any wetland which had three or more natural communities in any one of the three interspersion categories were considered to be of high quality and received the best numerical rating. Wetland sites with only one or two community types present and/or sites with little or no species diversity received a poorer numerical score.

This evaluation criteria for plant communities was used for all wetland community types with the exception of the northern flatwoods community type. Northern flatwoods are a relatively rare wetland community type in Illinois. This wetland community is characterized by a shallow, perched water table. These sites are typically very wet early in the year and gradually dry out by mid to late summer. These sites often include vernal pools and

remnants of wet prairie or sedge meadow. These sites provide important wildlife habitat for a number of wildlife species, especially amphibians. Since dominant plant species include swamp white oak, American elm, and black ash this community type appears to be fairly monotypic on aerial photos and, therefore, rated poorly using the vegetation interspersion evaluation criterion. Since this community type was considered to be rare in the state, of significant biological value, and very difficult to replace, sites consisting of northern flatwood community were automatically included as high functional value sites.

Plant/Open Water Ratio: In emergent wetlands, the most common wetland type found in Lake County, wildlife habitat quality is related to area or percent open water and the interspersion of open water with vegetation. Wetlands exhibiting the hemi-marsh condition have the highest wildlife diversity. Wetlands consisting primarily of open water or dominated by dense vegetative growth have lower habitat value and less wildlife species diversity (Weller, 1981). Many of the state listed threatened or endangered species which are wetland dependent require this hemi-marsh condition for breeding habitat. Wetlands exhibiting this type of interspersion received the best score while sites with less interspersion received poorer numerical scores.

7. **Soils:** Soils were used as another indicator of likelihood of disturbance. Since more saturated soils such as a Houghton or Peotone are more difficult to drain or otherwise alter their hydrology, it was assumed that the wettest soils would be less likely to have been disturbed by either farming or development activities. The wetter soils therefore, received the lowest score. In reality this factor had little effect on the outcome of the habitat scoring since with few exceptions nearly all of the sites evaluated had soils in the wettest category.

Numerical scores for each of these ecological factors are listed in Table 1.

Table 1. Photointerpretation Score Sheet for Ecological Factors

A. Drainage
- (1a) no visible drainage
- (1b) natural, unchannelized drainage swale
- (1c) lake, pond, or meandering stream
- (2) dammed (flow restricted, or deep water created)
- (3) tile drainage
- (4) ditched

B. Excavated
- (1) no visible excavation
- (2) 5-10% excavated
- (3) 10-25% excavated
- (4) > 25% excavated

C. Size
- (1) > 50 acres
- (2) 26-49 acres
- (3) 10-25 acres
- (4) < 10 acres

D. Physical Intrusions and Barriers
- (1) no apparent intrusion
- (2) < 10% filled
- (3) divided by barrier (ex: road or railroad)
- (4) > 10% filled

E. Surrounding Land Use (within 200 ft)
- (1) natural vegetation, undisturbed
- (2) old field, pasture
- (3) farmed
- (4) developed (urban)

*F. Vegetation Interspersion
- (1a) category 1
- (1b) category 2
- (1c) category 3
- (2) circular vegetation patterns present
- (3) vegetation patterns, more than 1 gray tone or more than one class
- (4) monotypic; near white tone

*F. Plant/Open Water Ratio
- (1) 40-60% open water
- (2a) 10-40% open water
- (2b) 60-90% open water
- (3) > 90% open water
- (4) < 10% open water

G. Soils
- (1) Houghton, Peotone, or marsh
- (2) Harpster, Montgomery, or Sawmill
- (3) Ashkim, Granby, or Pella
- (4) Soils with hydric inclusions

* Lowest of two numbers will be used

Calibration of Habitat Quality Scores

To calibrate the habitat quality scores, all wetlands identified on the National Wetland Inventory maps in randomly selected Sections of Lake County were rated using this habitat scoring system (N=54). The mean habitat quality score was 18.407 with a standard deviation of 3.946. Figure 1 is a histogram of the wetland scores. Superimposed is a graph of the theoretical normal distribution of the data base on the observed standard deviation and mean. Note that the sample data is nearly normal in distribution with a skew toward the higher values. With a normal distribution, 85% of the scores will be greater than a score 1 standard deviation below the mean (Roscoe, 1975). Since low scores are found in sites with several high quality attributes, sites with scores less than 1 standard deviation below the mean should contain the 15% highest quality wetlands. This translates to wetlands with scores of 14 or less deserving further examination. After preliminary field work, it was decided that sites with scores of 13 or less were likely to meet one of the criteria and would be field checked to confirm the presence of high quality habitat.

It is important to note that the method described above was the second step in the screening process used to identify wetlands with high quality habitat characteristics. (The first screening step involved reviewing aerial photos and eliminating obviously disturbed wetland sites.) The majority of sites which received a habitat score of 13 or less were field checked to verify that high quality plant communities or high quality wildlife habitat existed on the site. Field verification involved recording plant communities present, dominant plant species of each community type, and assessment of the degree of disturbance. In addition to this plant community information, notes were made on wildlife habitat structure, habitat value, surrounding land use, and wildlife species actually observed. This information was recorded for each site and can be found on the data sheets prepared for each ADID site. (Data sheets are printed under separate cover, titled *Advanced Identification (ADID) Study, Lake County, Illinois, Data Sheets*, dated November 1992.

Stream Evaluation Criteria

Streams within Lake County were evaluated using the method described below. All stream evaluation was done using 1990 aerial photography. For the purposes of evaluation, streams were divided into segments using existing structures such as roads or dams as segment endpoints. The stream evaluation methodology was designed to identify streams which still maintain a high degree of their natural character and are providing fish and/or wildlife habitat. Stream segments which have not been significantly disturbed by channelization or impoundments and have natural vegetation along their channels received better scores than stream segments which have been channelized and/or have had streamside vegetation removed or significantly altered.

Five factors were evaluated for each stream segment. These factors were headwaters condition, stream channel configuration, type of vegetation within 200 feet of the channel, presence or absence of impoundments, and flow augmentation. Numerical ratings for each factor are shown in Table 2.

As with the wetland evaluation scoring, the lower the score the better the quality of the stream. Stream segments which received a score of 10 or less were determined to be of high functional value, and therefore, identified as being high quality.

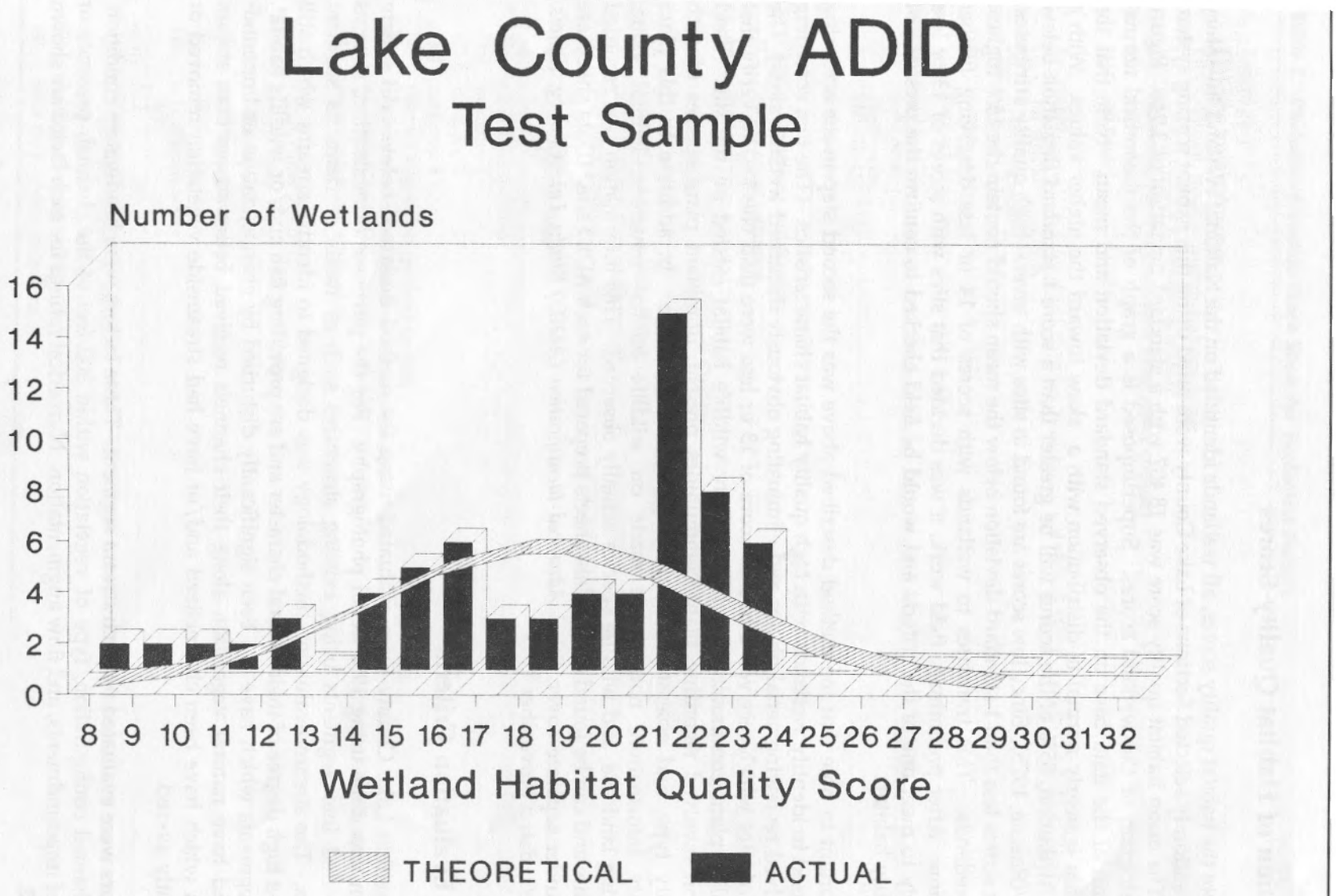

Figure 1. Lake County ADID Test Sample

Table 2. Stream Evaluation Criteria

A. Headwater Conditions
   (1) Unaltered wetland, pond, lake
   (2) Excavated or impounded wetland
   (3) Ditched wetland
   (4) Drained wetland (farming activities in place)

B. Stream Channel Configuration
   (1) Meandered or essentially unaltered
   (2) Up to 5% channelized
   (3) 6 to 25% channelized
   (4) > 25% channelized

C. Streamside Vegetation (within 200 ft)
   (1) >50% wetland or floodplain forest
   (2) >50% old field or scrub shrub vegetation
   (3) >50% agriculture
   (4) >50% urban

D. Impoundments
   (1) No dams present
   (2) Up to 5% of reach impounded
   (3) 6 to 15% of reach impounded
   (4) > 16% of reach impounded

E. Flow Augmentation
   (1) No visible augmentation (natural tributaries present)
   (2) Ditched tributaries
   (3) Storm sewer outfalls present
   (4) Sanitary sewer outfall present

D. Evaluation Methodology for Stormwater Storage Functions

Background

The function of wetlands in controlling flooding is widely recognized. Historical relationships between decreases in wetlands and increases in food damage have been demonstrated throughout the country. One rule of thumb cited in the literature states, when 10% or more of a drainage area contains wetlands, flood damage protection is stable with rapidly diminishing benefits as the ratio falls below 10%. Currently, Lake County as a whole is above the 10% ratio. Therefore, given the rapid pace of development and the county's history of flooding, it is essential that the ADID process identify those wetlands most critical to flood control.

Most methods for evaluating the flood control benefits of wetlands require time-consuming runoff and storage calculations. The wide geographic scope and limited resources of this project constrain the level of detailed analysis that can be performed. The subcommittee assigned to address stormwater functions recommended a three step procedure involving screening, map evaluation, and field checking. The objective of this procedure is to identify wetlands that have the highest propensity to provide significant flood control benefits.

Criteria

Factors which may indicate high flood control effectiveness include: size, wide seasonal fluctuations in water surface area, location in the watershed, configuration of outlets and inlets, sinuosity, and the presence of heavy erect vegetation (Adamus, 1987). These factors address flood storage, flood desyncronization, and flow attenuation functions. This study will focus primarily on storage functions by considering wetland size and location in the watershed. Several of the other criteria are considered in the evaluation of water quality functions.

Size: A linear relationship between wetland surface area and storage capacity is assumed. During flood conditions, a wetland's storage varies as its ponded surface area fluctuates. Assuming an average ponding depth of only two feet, a five acre wetland can store ten acre-feet of flood water and is deemed to be of high functional value for Lake County. Many wetlands of five or more acres are upland isolated wetlands and conserving their storage will protect adjacent developments as well as conserve downstream riverine floodplain capacity. The GIS is used to screen out wetlands of less than 5 acres. (It is notable that the average size of palustrine emergent wetlands in Lake County is about five acres, based on the NWI.)

Location: It may be argued that upland wetlands are more critical to managing flood volumes and peak flows than floodplain or riparian wetlands. Most upland wetlands not only pond water during flood conditions but they also detain or retain stormwater, much like designed detention basins, releasing it slowly after the flood peak has passed.

Riverine wetlands also store flood waters and help to reduce flood velocity. However, for this evaluation it is assumed that the storage function of riverine wetlands coincides with general floodplain functions. Floodplains and floodway hydrologic functions are protected to a large degree under current floodplain regulations. Therefore, for purposes of ADID evaluation, only wetlands with more than 50% of their area lying outside a regulatory riverine floodplain are deemed to have high value in providing stormwater storage functions. Wetlands meeting this criterion are typically palustrine wetlands and headwater riverine wetlands. This evaluation is made using the previously referenced GIS maps of LCWI wetlands and FEMA floodplain overlays.

Outlet Restrictions: Wetlands with restricted, controllable or no outlet are assumed to have the best ability to store or detain stormwater runoff. It is assumed that most upland wetlands meeting the preceding criteria will have some degree of outlet restriction and, therefore, this criterion is not evaluated explicitly for each wetland. However, all wetlands which are classified as high quality ADIDs are verified in the field. (Field evaluation is discussed in greater detail in a subsequent section.)

STORMWATER STORAGE

Step	Criteria	Threshold
I. (Screen)	Propensity for significant stormwater storage	> 5 Acres
	If "yes" ⇩	
II. (Map evaluation)	Value in performing function	
	- At least 50% Outside of Regulatory Riverine Floodplain	Yes No
	If "yes" ⇩	
III. (Aerial photo and field evaluation)	Effectiveness	
	- Potential for significant ponding exists	Yes No

E. Evaluation Methodology for Water Quality Mitigation Functions

Background

Wetlands are widely known to provide valuable water quality mitigation functions which protect adjacent or downstream waterbodies. Based on a review of several references, particularly the WET manual and the Minnesota manual, several water quality mitigation functions were considered to be important for evaluating wetland quality. These functions included the ability of wetlands to provide for shoreline and bank 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 is necessary to adopt a simpler evaluation procedure. The approach recommended by the water quality subcommittee involves a three step procedure of screening, map or desk-top evaluation, and field evaluation, as needed. This approach includes an assessment of the ***opportunity*** of an individual wetland to perform a specified function to a significant degree as well as its expected ***effectiveness*** in performing the function.

1. Shoreline/Bank 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. This function is similar to the "shoreline anchoring" function described in the Minnesota Wetland Evaluation Methodology. Shoreline/bank 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 emergent or floating-leaved vegetation to dissipate the erosive forces of waves or currents.

The first step in evaluating this function 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/bank stabilization if there is the presence of flowing water, such as in a perennial stream, or there is open water present at least 100 feet in width.

The U.S. Army Corps of Engineer's regulatory definition of a headwater stream, which is a stream with an average annual flow of at least 5 cubic feet per second (cfs), was chosen as the cutoff for determining the presence of flowing water. In Lake County, a stream with a natural flow of 5 cfs will typically have a drainage area of about 7 square miles. It is assumed in this interpretation that wetlands have less opportunity to perform bank stabilization in small, intermittent streams.

Similarly, the selection of 100 feet of open water was based on the need for shoreline stabilization. It is assumed that non-flowing water bodies narrower than 100 feet will be less susceptible to shoreline erosion due to minimal opportunity for wave buildup. Therefore the opportunity for shoreline stabilization is low. The evaluation of the specified screening criteria of at least a 7 square mile drainage area for streams or a minimum of 100 feet of open water was done using information from the Lake County GIS and recent aerial photographs.

Effectiveness in performing shoreline and bank stabilization is assumed to be a function of the width of stabilizing vegetation present. WET references a width of at least 20 feet of erect vegetation. The recommended methodology adopts this width for lacustrine shoreline environments. However, the recommended methodology recommends a minimum width of erect vegetation of 10 feet for riverine environments. This recommendation is based on actual observations and experience in Lake County where relatively narrow widths of wetland vegetation appear to be quite effective in providing bank stabilization.

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 of 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.

In many instances, the evaluation of effectiveness based on vegetation width can be performed using information from the GIS (i.e., NWI determinations). For example, the presence of mapped palustrine wetlands along the periphery of lacustrine environments will be an indication of the shoreline stabilization function being performed. However, in some cases, the information available on GIS is not adequate and review of aerial photos and/or field evaluations are necessary. This is true particularly in the case of relatively narrow strips of wetland vegetation which may not be well identified on the GIS data base.

After performing screening based on GIS mapping, aerial photographs (1 inch = 400 feet) were analyzed to check the above criteria. Certain types of wetland environments were immediately excluded based on review of aerials. These included lacustrine wetlands (i.e., lakes) with manicured shorelines, artificial excavated ponds with steep sides (e.g., detention basins), channelized streams, and highly incised stream channels.

2. Sediment/Toxicant Retention

WET defines this function as the ability to physically (or chemically) trap or retain on a net annual basis the 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 or conversion of constituents to less toxic forms.

The recommended procedure for evaluating wetlands relative to this function starts with a screening step. Because of the large number of wetlands in the county, a size cutoff of 5 acres is used to reduce the number of wetlands to be evaluated. 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. By eliminating all wetlands smaller than 5 acres from consideration, a manageable number can be evaluated in more detail.

The next step in the methodology is 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 Lake County wetland watersheds.

The final step in evaluating wetlands for the sediment/toxicant retention function is a determination of effectiveness. A wetland is considered effective at providing sediment/toxicant retention if it meets one of the following conditions (derived from WET): the wetland has no defined low-flow outlet or is impounded; the wetland is vegetated with erect, persistent vegetation in a depositional environment; or there is actual evidence of sediment accretion. In contrast, a wetland is assumed to be relatively ineffective at providing sediment/toxicant retention if it is tilled; it is channelized and infrequently inundated; or if prevailing current velocities exceed suspension thresholds of sediment. In many cases, this effectiveness evaluation requires field inspection for final verification. In some cases, such as for an impounded wetland, interpretation of aerial photographs is adequate.

3. 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, nutrient removal/transformation is assumed to be of notable value in Lake County only if the wetland in question is upstream or adjacent to a lake or impoundment. This distinction is made because of the critical impact of excess nutrients on impounded waters. The impact of nutrients on flowing waters is less significant due to a lower propensity to develop problems related to excess vegetation.

The first step in this evaluation is a screen to eliminate from consideration all wetlands less than 5 acres in size. The 5 acre cutoff is used, as before, to limit the number of wetlands requiring evaluation to a manageable number.

The second step in this evaluation is a rating of the opportunity of a wetland to perform the nutrient removal/transformation function to a significant degree. Initially, a check is made to determine that the wetland is in the palustrine or riverine category. Wetlands which are strictly lacustrine without substantial adjacent palustrine areas are excluded from consideration based on the argument that lacustrine wetlands primarily transform or recycle nutrients internally. Palustrine wetlands on the periphery of a lake, on the other hand, may be very effective in controlling the input of nutrients and their related adverse impacts in the lake. This check is made by evaluating aerial photographs.

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 nearly all wetlands in Lake County lie downstream of significant potential nutrient sources. Another criterion used to judge whether there is significant opportunity, or benefit, for nutrient removal/transformation is the presence of a lake or impoundment downstream of the wetland which stands to benefit from this function and that the wetland is hydrologically connected to the lake. The opportunity for nutrient removal/transformation is determined to be significant only if the wetland lies downstream of potential point or nonpoint nutrient sources and the wetland is hydraulically connected, upstream of a lake or impoundment of at least six acres in size. (The Illinois Department of Conservation uses six acres as the minimum size to define a lake.) Hydraulic connection is determined by checking mapped surface water features from the GIS maps and is field verified in situations of uncertainty.

The final step in this evaluation is the interpretation of wetland effectiveness in providing nutrient mitigation functions. Two criteria are recommended based on WET. To be effective in removing or transforming nutrients, 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. WET adds that sediment retention is often, but not always, accompanied by nutrient retention.

The specific steps for performing the described water quality mitigation evaluations follow.

SHORELINE/BANK STABILIZATION

Step	Criteria	Threshold	
(Map and aerial photo evaluation)	Opportunity to perform function		
	Presence of flowing water (perennial stream, >7 mi^2 drainage area)	Yes	No
	(or)		
	Presence of at least 100 feet of open water	Yes	No
	If "yes" ⇩		
II. (Aerial photo and field evaluation)	Effectiveness		
	Presence of at least 20 feet of erect vegetation, or forest of scrub-shrub, or good water and vegetation interspersion along lake	Yes	No
	(or)		
	Presence of at least 10 feet of erect vegetation, or forest of scrub-shrub, or good water and vegetation interspersion along stream	Yes	No

SEDIMENT/TOXICANT RETENTION

Step	Criteria	Threshold
I. (Screen)	Propensity for <u>significant</u> sediment/toxicant retention	≥ 5 acres
	If "yes" ⇩	
II. (Map evaluation)	Opportunity to perform function	
	Presence of potential point or nonpoint sources upstream *	Yes No
	If "yes" ⇩	
III. (Aerial photo and field evaluation)	Effectiveness	
	No outlet, constricted outlet, or impounded	Yes No
	(or)	
	Vegetated with erect, persistent vegetation in a depositional environment	Yes No
	(or)	
	Evidence of sediment accretion present	Yes No

* *This will almost always be* ***"yes."***

NUTRIENT REMOVAL/TRANSFORMATION

Step	Criteria	Threshold
I. (Screen)	Propensity for <u>significant</u> nutrient removal/transformation	≥5 acres
	If "yes" ⇩	
II. (Map and aerial photo evaluation)	Opportunity to perform function	
	- Presence of potential point or nonpoint sources upstream *	Yes No
	(and)	
	- Wetland is palustrine or riverine	Yes No
	(and)	
	- Wetland is located upstream of a lake or impoundment (≥6 acres) and hydraulically connected	Yes No
	If "yes" ⇩	
III. (Aerial photo and field evaluation)	Effectiveness	
	- No outlet, constricted outlet, or impounded	Yes No
	(or)	
	- Vegetated with woody, floating leaved, or persistent emergent vegetation in a low velocity environment	Yes No

* *This will almost always be "yes."*

III. Determination of ADID High Functional Quality Wetlands

A. Determination Criteria

The Lake County ADID focused on identifying wetland areas that would generally be considered unsuitable for fill. The determination of unsuitability was made in a manner consistent with Section 230.10(c) of the 404 (b)(1) Guidelines. The proposed identification of unsuitability was based primarily on the determination that significant degradation of the aquatic ecosystem would occur if filling were to be permitted in these areas.

For the Lake County ADID the Technical Steering Committee selected five wetland functions on which to base the determination of unsuitability. These functions included sites with high biotic community value, stormwater storage value, shoreline/bank stabilization value, sediment/toxicant retention value and nutrient removal/transformation value. Wetlands determined to be of High Functional Value were determined to be unsuitable for fill or other destructive activities. A wetland was identified as being a High Functional Value wetland based on the following.

Wetlands which were determined to consist of high quality biotic communities, based on the evaluation methodology described in Chapter II, were automatically considered to be High Functional Value wetlands, or unsuitable. This determination was based on the fact that these wetland sites contained animal species or plant species or communities which are rare in Lake County and the loss or degradation of these sites would result in a significant adverse impact to the aquatic ecosystem.

A wetland was also determined to be of High Functional Value, or unsuitable, if the site provided three of the four stormwater storage or water quality functions as determined by the criteria described in Chapter II. These wetlands were considered to be equivalent to the wetlands of high biological value. The loss or degradation of these sites would also result in a significant adverse impact to the aquatic ecosystem.

An example of a high quality stormwater/water quality wetland would be a palustrine wetland greater that 5 acres in size, outside of the FEMA floodplain, and upstream of and hydrologically connected to a large lake. Such a wetland would meet the high functional criteria for stormwater storage, sediment/toxicant retention, and nutrient removal/transformation. Destruction of such a wetland would cause degradation of the downstream lake and downstream water quality in general.

In summary, in order to be classified as a High Functional Value wetland, it must be shown that the biological habitat criteria are met or three of the four stormwater storage and water quality mitigation criteria are met.

B. Field Verification

In addition to meeting the evaluation criteria described in Chapter II, most wetlands which were classified as high quality ADID wetlands were field verified. (It was considered unnecessary to field verify certain well known wetlands such as Volo Bog, however, which clearly met evaluation criteria for high biological value.) Field verification of high quality habitats and plant communities involved a site visit to record plant communities present, dominant plant species of each community type, and assessment of the degree of disturbance. In addition to plant community information, notes were made on wildlife habitat structure, habitat value, surrounding land use, and wildlife species observed.

If a wetland was determined to meet high quality criteria for both habitat and stormwater/water quality functions, field verification of only habitat quality was performed. For all wetlands which met only stormwater and water quality ADID criteria, specific field verification of these criteria was performed. Verification of stormwater and water quality functions entailed checking of factors such as type and extent of wetland vegetation, depositional and outlet control characteristics, degree of ditching, and hydraulic connectivity. In addition to verifying these effectiveness criteria, field checking also was important in identifying recent wetland disturbances which were not evident on aerial photographs.

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