KANSAS
INTERIM HYDROGEOMORPHIC (HGM)
FUNCTIONAL ASSESSMENT MODEL

DEPRESSIONAL WETLANDS

October 1, 2007

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Section I - Introduction

General

Wetlands have properties of both aquatic and terrestrial ecosystems. Their most widely valued function is providing habitat for fish, birds, and other wildlife (contributing to the maintenance of biodiversity). In addition to this "food chain" support function, wetlands carry out hydrologic functions and water quality improvements, all of which are important to society as a whole. They also provide recreational, educational, research, and aesthetic functions.

Wetland Functions

Wetland functions are the normal or characteristic activities that take place in wetland ecosystems or simply, the things that wetlands do. Wetlands perform a wide variety of functions in a hierarchy from simple to complex as a result of their physical, chemical, and biological attributes. All wetlands do not perform all functions to the same degree of magnitude. The functions selected for assessment should reflect the characteristics of the wetland ecosystem and landscape under consideration and the assessment objectives.

The HGM system of wetland classification recognizes three broad wetland functions. They include functions related to hydrology, biogeochemical processing, and wildlife/biological habitat. Specific wetland functions have been identified with respect to the three broad functions. Moderation of groundwater flow is an example of a slope wetland function. It can be defined as "the capacity of the wetland to regulate the outflow of groundwater." On-site effects include contribution to the maintenance of characteristic soils, vegetation, invertebrate and vertebrate communities, and the moderation of groundwater flow. Off-site effects include modification of off-site hydrology of wetland and riverine systems within the groundwater and surface water flow network.

Summary of HGM Approach

The three main components of the HGM approach include: (1) HGM (functional) classification, (2) comparison sites for wetlands, and (3) assessment models/functional indices.

HGM Classification

HGM Classification is based on three factors: geomorphic setting, water source, and hydrodynamics.

Section I - Introduction, continued

HGM Classification, continued

Regardless of how they are defined, all wetlands share some common hydrologic, soil, and vegetative characteristics. Beyond these similarities, however, wetlands exhibit wide variation in terms of their size, complexity, and physical, chemical, and biological characteristics and processes.

At the highest level of HGM classification, wetlands are grouped into HGM wetland classes. Seven hydrogeomorphic classes are recognized. They include depressions, lacustrine fringes, tidal fringes, slopes, riverines, mineral soil flats, and organic soil flats.

Comparison Sites

In order to assess impacts to wetland functions, standards of comparison must be defined for what constitutes chemical, physical, and biological integrity in the context of a wetland. Establishing comparison sites has two complications.

First, wetland ecosystems and their surrounding landscapes are dynamic and constantly changing. As the characteristics that influence function change, functional capacity may increase or decrease. These changes are the result of natural short-term processes such as seasonal cycles of precipitation and temperature; and long-term processes that include population dynamics, erosion and depositional processes, succession, drought/wet cycles, or sea level rise. In establishing comparison sites, the variability that occurs as a result of natural processes must be taken into account.

Second, establishment of comparison sites is further complicated by the variability exhibited by wetland ecosystems and landscapes in response to anthropogenic disturbance. Land-use changes and hydrologic alteration of wetland ecosystems and their surrounding landscapes and the resultant lack of undisturbed wetland ecosystems and landscapes make it difficult to establish comparison sites that reflect the functional capacity of a regional subclass under undisturbed conditions.

Because wetland ecosystems exhibit a wide range of conditions as a result of natural processes and anthropogenic disturbances, and few undisturbed wetland ecosystems or landscapes exist, this assessment approach establishes comparison sites based on reference wetlands. Reference wetlands are actual wetland sites that represent the range of variability exhibited by a regional wetland subclass as a result of natural processes and anthropogenic disturbances.

In establishing comparison sites, the geographic area from which reference wetlands are selected is the reference domain. The reference domain may include all, or part, of the geographic area in which the regional subclass actually occurs.

Section I - Introduction, continued

Comparison Sites, continued

Once the reference domain has been defined, there are a variety of approaches for selecting reference sites, establishing the variability of a regional subclass in a reference domain, and defining comparison sites.

Assessment Models/Functional Indices

Assessment models are simple representations of the relationship between attributes of the wetland ecosystem and the surrounding landscape, and the functional capacity of the wetland. Variables in the assessment model, such as plant species composition, over-bank flow, and soil type, represent the attributes. Variables are assigned a sub-index ranging from 0.0 to 1.0 based on the relationship between the variable and functional capacity.

Variables in the assessment model are assigned a sub-index based on a quantitative (interval or ratio) or qualitative (nominal or ordinal) scale data. When it is impossible or impractical to assign a sub-index based on direct, quantitative or qualitative data, it may be possible to assign a sub-index based on an indicator. Indicators are easily observed or measured characteristics that are correlated with a quantitative measure of a variable.

In addition to defining the relationship between variables and functional capacity, the assessment model defines how variables interact to influence functional capacity. The interaction between variables is defined using an aggregation function or logical rules. The result is a Functional Capacity Index (FCI), which is the ratio of the functional capacity of a wetland under existing conditions, and the functional capacity of a wetland exhibiting comparison sites for the regional subclass in the reference domain.

Recommended Tools to Use for Wetland Assessment

Office Tools

- United States Geological Survey (USGS) quadrangle maps
- United States Fish and Wildlife Service (FWS) National Wetland Inventory (NWI) maps
- Aerial photography of wetland and surrounding watershed area
- County soil survey publication
- Engineering field manual
- Engineers scale
- Tools for acreage calculation
- Farm Service Agency (FSA) color slides
- Natural Resources Conservation Service (NRCS) wetland inventories

Section I - Introduction, continued

Recommended Tools to Use for Wetland Assessment, continued

Other Considerations

- Insect repellent
- Sunscreen
- Hip or chest waders or rubber boots
- Binoculars
- Global positioning system (GPS)
- Containers for plant collection
- Local representative knowledgeable about area resources and land uses
- Kansas Biological Survey Plant Identification Services

Field Tools

- Slope Wetland Interim Functional Assessment Model
- Aerial photography of wetland and surrounding area
- surveying equipment such as; hand, abney, or transit level, rod or stadia board, measuring device (100 foot chain)
- National list of plant species
- Plant identification handbooks
- Plant press, plastic bags, and labeling materials
- Spade, soil probe, or auger
- Soil field kit including; Munsell color book, tape measurer (English or metric), steel spatula or knife, acid, water, field indicators of hydric soils in the United States, hand lens
- Field recording sheets
- Clipboard, paper, and pencils
- Flags (two or more colors suggested)
- Tube markers
- Calculator
- Photographic equipment (optional)
- Tile probe (optional)

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10)

F1: Maintenance of Characteristic Hydrologic Regime

Definition: The capacity of a wetland to maintain characteristics static and/or dynamic storage, soil moisture, and ground water interactions.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F1: Maintenance of Characteristic Hydrologic Regime, continued

Effects On-Site: Contribute to the maintenance of characteristic soils, vegetation, and invertebrate and vertebrate communities and provides for storm water storage.

Effects Off-Site: Modified off-site hydrology of wetland and riverine systems within the surface water and/or groundwater flow net.

Discussion of Function and Variables: The "maintains characteristic hydrologic regime" function encompasses all the hydrologic attributes of depressional wetlands (by contrast, five hydrologic functions are identified for riverine systems in the Riverine Guidebook). All hydrologic processes are modeled by one function because depressional wetlands and their surrounding landscapes (watersheds) are tightly linked. For example, land-use activities in surrounding uplands **(V_{upuse})** affect infiltration of precipitation, thus regulating the overland flow-to-groundwater ratio describing movement of water into depressional wetlands. Further, because overland flow and ground water sources differ both in water quality and speed of delivery from the precipitation source, land-use in a wetland depressional **(V_{wetuse})** may affect evapotranspiration, soil structure, and soil moisture.

Sediment delivery **(V_{sed})** may completely eliminate dynamic and static water storage if a wetland fills with sediment and its basin is eliminated. Lowering the elevation of an outlet may drain depressional wetlands completely while raising an outlet will cause a depression to flood more deeply **(V_{out})**. Further, source area flow interception **(V_{source})** of surface water with ditches or subsurface water with drainage tiles removes water that would otherwise flow to a wetland basin from its catchment's.

Addressing depressional wetlands that have substantial surface flow-through, for example, inlets and outlets, roughness features **($V_{micro} + V_{pden} + V_{detritus}$)** serve to detain flow, thus contributing to dynamic storage.

Functional Capacity Index (FCI) Score: FCI Score = **$[V_{mod} + V_{sed} + V_{source} + Vu_{puse} + V_{wetuse} + ((V_{detritus}) + V_{micro} + V_{pden})/3)] / 6$**.

F2: Elemental Cycling for Closed Basins

Definition: Abiotic and biotic processes that convert elements such as nutrients and metals from one form to another. Also defined as the primary recycling processes.

Effects On-Site: Effects of cycling are elemental balances between gains through import processes and losses through efflux to the atmosphere, long-term retention in sediments, and hydraulic export. Hydraulic export is minimal unless outlet leaves the basin. For this reason retain separate outlets that allow water to move elements and compounds out in the basin, versus pits which keep them on site.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F2: Elemental Cycling for Closed Basins, continued

Effects Off-Site: To the extent that elements and nutrients are held (and processed) on-site, they are less available for export to downstream wetlands and to other aquatic environments.

Discussion of Function and Variables: Elemental cycling requires wetland plants and soil microorganisms for uptake and release of elements through growth, decomposition, and leaching. Plants, influenced by land-use activities within a depressional wetland and its adjacent buffer zone**(V_{wetuse} + $V_{buffcon}$ + $V_{buffwid}$)** provide a strong seasonal pulse of temporary storage and release of elements, including nutrients. Soil pores **(V_{pore})** provide surface area for soil water contact and increased surface area for microbial activity. Seasonal uptake and release is a fundamental ecological function shared by all temperate and subtropical ecosystems containing plants.

Functional Capacity Index (FCI) Score: FCI Score = **[(((($V_{buffcon}$ + $V_{biffwid}$) / 2) + V_{wetuse})/ 2) + V_{mod} + V_{pore} + V_{sed}] / 4** .

F3: Retention of Particulates

Definition: Deposition and retention of inorganic and organic particulates (>0.45 um) from the water column, primarily through physical processes.

Effects On-Site: Sediment deposition in a basin is a natural geologic process that is maintained over thousands of years. The presence of these sediments in conjunction with the soil-forming processes that follows will result in the wetland having characteristic substrate geochemistry, and hydrology.

Effects Off-Site: Reduces potential export of sediment to other wetland and aquatic systems down stream. Off-site effects are minimal in a closed drainage system. The only way there is sediment carried off-site is if outlets are present.

Discussion of Function and Variables: When the function is applied to a depressional wetland that has a surface outlet, land-use activities within both the wetland watershed **(V_{upuse})** and wetland **(V_{wetuse})** of a depression, control the supply of particulates and the capacity of the depression to retain them. If a depression receives sediment **(V_{sed})** at a rate that prevents it from maintaining itself on the geologic timescales, for example when it is filling, the function is not sustainable and receives a lower index score. However, if a depressional wetland has no surface outlet, it will trap sediments regardless of the types of activities that occur within its basin. Therefore, the land-use activity variable **(V_{wetuse})** is omitted when modeling depressions without outlets.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F3: Retention of Particulates, continued

Functional Capacity Index (FCI) Score: If the wetland has no outlet the wetland variable **(V_{wetuse})** is not relevant. FCI Score = **$[((V_{sed} + V_{upuse})/2) \times V_{mod}]^{1/2}$**.
If the wetland has an outlet the wetland variable is used. FCI Score = **$[((V_{sed} + V_{upuse} + V_{wetuse})/3) \times V_{mod}]^{1/2}$**.

F4: Removal of Imported Elements and Compounds

Definition: Removal of elements and compounds can occur in depressions by accumulation of these constituents in sediments, denaturation of complex organics, and by processes that release them into the atmosphere, for example denitrification.

Effects On-site: Nutrients and contaminants in surface and ground water that come into contact with sediments and vegetation are either removed over the long term by sedimentation or are transformed into innocuous and biogeochemical inactive forms.

Effects Off-site: Chemical constituents removed and concentrated in wetlands reduce potential for downstream export to other wetland and aquatic ecosystems. In addition, removal of pollutants in soil solution reduces contamination of groundwater as does the removal of imported nutrients, contaminants, other elements and compounds via biotic and abiotic processes.

Discussion of Function and Variables: Removal of elements and compounds can occur in flow-through depressions by the more-or-less permanent accumulation of these constituents in sediments, by denaturation of complex organics, and by processes that release them into the atmosphere, such as denitrification. In forested depressions, storage of elements via uptake by trees represents a relatively long-term accumulation (sink) of elements. Therefore, land-use both within **(V_{wetuse})** and adjacent **($V_{buffcon}$ + $V_{buffwid}$)** to a depression and the delivery of sediments **(V_{sed})** are important to the removal of elements and compounds. Soil pore **(V_{pore})** provides surface area for soil water contact and increased surface area for microbial activity. Lowering an outlet **(V_{out})** may drain a wetland completely; and if it raises the outlet **(V_{out})** the result could be a deeper depression.

Microtopographic roughness **(V_{micro})** plant density **(V_{pden})**, and detritus **($V_{detritus}$)** detain water flow to increase residence time for uptake and breakdown processes. Small-scale roughness also provides surfaces for attachment of microorganisms that are responsible for much of the sequestering, interconversion, and breakdown of imported materials.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F4: Removal of Imported Elements and Compounds. continued

Functional Capacity Index (FCI) Score: FCI Score = $\mathbf{((V_{buffcon} + V_{buffwid}) / 2) + V_{mod} + V_{pore} + V_{sed} + V_{wetuse} + (V_{micro} + V_{detritus} + V_{pden}) / 3) / 6}$.

F5: Exports Organic Carbon and Detritus for Through Flow Systems

Definition: Export of dissolved and particulate organic carbon and detritus from the wetland through leaching, flushing, displacement, and erosion.

Effects On-Site: The removal of organic matter from living biomass, detritus, and soil organic matter contributes to carbon turnover (plant storage) and food web support.

Effects Off-Site: Provides support for food webs and biogeochemical processing from the wetland. For through flow systems, leaching, flushing, displacement, and erosion provide the means by which dissolved and particulate organic carbon and detritus are exported.

Discussion of Function and Variables: **This function is not to be used in closed depressions where there is no natural outlet. It should be used for depressional wetlands with through flow.** Multiplying two sets of variables and calculating the square root emphasizes that this function has two interdependent requirements: (1) organic matter as a source of organic carbon, and (2) a pathway for exporting organic matter **(V_{mod})**. The presence of outlets in an assessed depressional wetland must be scored relative to appropriate comparison sites. The remaining variables used in this function **(V_{micro}, V_{pden}, $V_{detritus}$)** reflect the source of organic matter in plants, soil, and detritus.

Functional Capacity Index (FCI) Score: FCI Score = $\mathbf{[V_{mod} \times (((V_{buffcon} + V_{buffwid}) / 2) + V_{wetuse} + (V_{detritus} + V_{micro} + V_{pden}) / 3) / 3)]^{1/2}}$.

F6: Maintains Characteristic Plant Community

Definition: Characteristic plant communities that are not dominated by exotic or nuisance species. Vegetation is maintained by mechanisms such as seed dispersal, seed banks, and vegetative propagation which (all) respond to variations in hydrology and disturbances such as fire and herbivores. The emphasis is on the temporal dynamics and structure of the plant community as revealed by species composition and abundance.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F6: Maintains Characteristic Plant Community, continued

Effects On-Site: Creates microclimatic conditions that support the life histories of plants and animals. Solar radiation and carbon dioxide are converted into complex organic carbon that provides energy to drive food webs. Also provides the following habitat enhancements for resident and migratory animals: feeding, cover for resting, refuge, escape, and breeding and nesting.

Effects Off-Site: Provides a source of vegetative propagules for adjacent ecosystems which assists in revegetation following drought or disturbance and provides for gene flow between populations. Provides corridors (migratory pathways) between habitats, enhances species diversity and ecosystem stability, and provides habitat and food for migratory and resident animals. Characteristic plant communities are not dominated by exotic or nuisance species. Vegetation is maintained by mechanisms such as seed dispersal, seed banks, and vegetative propagation which (all) respond to variations in hydrology and disturbances such as fire and herbivores. The emphasis is on the temporal dynamics and structure of the plant community as revealed by species composition and abundance.

Discussion of Function and Variables: The capacity to perpetuate a plant community through maintaining mechanisms for seed dispersal, providing substrate conducive to seed burial and storage (seed bank), and conditions conducive to vegetative propagation (a response to stressors of drought and disturbance by fire and herbivores). This function emphasizes the dynamics and structure of a depression's plant community, determined by species composition and abundance.

The ability of the plant community to maintain itself or the changes that will occur over time in the community is captured by characterizing five variables. The species composition of the community **(V_{pratio})** is used as an indicator of current conditions as compared to the reference standard. Vertical structure **(V_{strata})**, the number of vertical layers of vegetation and canopy **(V_{canopy})** are variables used in the plant community to compare to reference conditions. Biomass structure as density **(V_{denba})** and basal area of trees in the plant community provide one of the best combined measures of the maturity of vegetation. The species present as seedlings, saplings, and dominant herbs will provide insight into how the vegetation will change over time.

Functional Capacity Index (FCI) Score: Herbaceous (non-wooded or forested) FCI Score = $\mathbf{(V_{canopy} + V_{mod} + V_{pratio} + V_{sed} + V_{wetuse}) / 5}$. Wooded or forested FCI Score = $\mathbf{(V_{canopy} + V_{denba} + V_{mod} + V_{pratio} + V_{sed} + V_{wetuse}) / 6}$.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F7: Maintain Habitat Structure Within Wetland

Definition: Soil, vegetation, and other aspects of ecosystem structure within a wetland are required by animals for resting, feeding, hiding, and reproduction.

Effects On-Site: Provides potential feeding, resting, hiding, escape, nesting, and brooding sites for vertebrates and feeding surfaces for invertebrates.

Effects Off-Site: Provides habitat cover for migratory birds and resident wildlife.

Discussion of Function and Variables: As is true for a number of the other depressional functions, land-use activities **(V_{wetuse})** and sediment delivery **(V_{sed})** are important in maintaining faunal habitat. Buffer zone **(V_{buff})** is a measure of the land use and condition adjacent to the wetland.

Functional Capacity Index (FCI) Score: FCI Score = **$[((V_{buffcon} + V_{buffwid}) / 2) + ((V_{sed} + V_{wetuse})/2) + V_{canopy}] /3$**.

F8: Maintain Food Webs

Definition: Food webs require both an energy source and habitat for consumers.

Effects On-Site: Provides the material of live and dead plant and animal tissue to support both terrestrial and aquatic food webs.

Effects Off-Site: Supports food webs of organisms that use other wetlands and terrestrial habitat.

Discussion of Function and Variables: Food webs require both an energy source (primary production of appropriate species of plants) and habitat for consumers. Therefore, variables pertaining to land-use **(V_{upuse}, V_{wetuse}, $V_{buffcon}$, $V_{buffwind}$)** are heavily weighted in this function. The other indicators include the sustainability of a depression's basin **(V_{sed})**, landscape habitat factors **($V_{landsap}$)**, native to non-native plant species ratio **(V_{pratio})**, and the presence of litter and debris **($V_{detritus}$)**. All indicators that could serve as variables should be incorporated into regional variations of "maintains food web" functional model.

Functional Capacity Index (FCI) Score: FCI Score = **$[((V_{buffCON} + V_{buffwid}) / 2) + V_{detritus} + V_{landsp} + V_{pratio} + V_{sed} + V_{upuse} + V_{wetusE}] / 7$**.

Section II - Discussion of Depressional Wetland Functions and Associated Functional Capacity Indices (F1 - F10), continued

F9: Maintains Habitat Interspersion and Connectivity Among Wetlands

Definition: The spatial distribution of an individual wetland in reference to adjacent wetlands within the complex.

Effects On-Site: The assessed wetland contributes to habitat features of the wetland complex by virtue of its position in the landscape.

Effects Off-Site: Contributes to overall landscape diversity of habitat for aquatic and terrestrial organisms.

Discussion of Function and Variables: While this function shares several variables with F8 (maintains food web) there is a fundamental difference between the two models. Local habitat conditions reflecting land-use activities **(V_{upuse})** and **(V_{wetuse})** are interdependent with landscape-level variables through multiplication. Thus depression that scores zero in either local habitat attributes or potential landscape variables will not perform this function. Connectivity among wetlands is seen as essential to maintaining habitat in both time and space through the presence of surface water connections to other aquatic ecosystems.

Functional Capacity Index (FCI) Score: FCI Score = $\mathbf{[((V_{MOD} + V_{upuse} + V_{wetuse}) / 3) \times V_{wden}]^{1/2}}$.

F10: Maintains Characteristic Invertebrate Community

Definition: Density and spatial distribution of invertebrates that exploit and contribute to food web.

Effects On-Site: Provides food to predators, aerates soil by building tunnels, and increases availability of organic matter for nutrient cycling microbes.

Effects Off-Site: Provides food for wide ranging predators.

Discussion of function and variables: None.

Functional Capacity Index (FCI) Score: FCI Score = $\mathbf{(V_{dpond} + V_{fpract} + V_{sprod}) / 3}$.

Section III - Functional Capacity Index (FCI) Score Equations

Function 1: Maintains Characteristics of Hydrological Regime

The hydrological regime is the capacity of a wetland to maintain characteristic static and/or dynamic storage soil moisture, ground water interactions.

FCI Score = $[V_{mod} + V_{sed} + V_{source} + V_{upuse} + V_{wetuse} + ((V_{detritus}) + V_{micro} + V_{pden}) / 3)] / 6.$

Function 2: Maintains Elemental Cycling

Abiotic and biotic processes convert elements such as nutrients and metals from one form to another, primarily recycling processes for closed basins.

FCI Score = $[((((V_{buffcon} + V_{buffwid}) / 2) + V_{wetuse})/ 2) + V_{mod} + V_{pore} + V_{sed}] / 4$.

Function 3: Retains Particulates

The deposition and retention of particulate inorganic and organic matter from the water column is primarily through physical processes.

If wetland has no outlet, then FCI Score = $[((V_{sed} + V_{upuse}) / 2) \times V_{mod}]^{1/2}$. If wetland has an outlet, then FCI Score = $[((V_{sed} + V_{upuse} + V_{wetuse}) / 3) \times V_{mod}]^{1/2}$.

Function 4: Removes dissolved elements and compounds

The removal of imported nutrients, contaminants, and other elements and compounds via biotic and abiotic processes for though flow systems.

FCI Score = $(((V_{buffcon} + V_{buffwid}) / 2) + V_{mod} + V_{pore} + V_{sed} + V_{wetuse} + (V_{detritus} + V_{micro} + V_{Pden}) / 3) / 6.$

Function 5: Exports Organic Carbon and Detritus

Export of dissolved and particulate organic carbon and detritus from a wetland through leaching, flushing, displacement, and erosion for through flow systems.

FCI Score = $[V_{mod} \times (((V_{buffcon} + V_{buffwid}) / 2) + V_{wetuse} + (V_{detritus} + V_{micro} + V_{pden}) / 3) / 3)]^{1/2}$.

Function 6: Maintains Characteristic Plant Community

The capacity to perpetuate a plant community through maintaining mechanisms for seed dispersal, providing substrata conducive to seed burial and storage (seed bank), and maintain conditions conducive to vegetative propagation (a response to stressors of drought and disturbances by fire and herbivores). This function emphasizes the

Function 6: Maintains Characteristic Plant Community, continued

dynamics of structure of a depression's plant community determined by species composition and abundance.

Herbaceous (non-wooded or forested) FCI Score = (V_{canopy} + V_{mod} + V_{pratio} + V_{sed} + V_{wetuse}) / 5. Wooded or forested FCI Score = (V_{canopy} + V_{denba} + V_{mod} + V_{pratio} + V_{sed} + V_{wetuse}) / 6.

Function 7: Maintain Habitat Structure within Wetland

Soil, vegetation, and other aspects of ecosystem structure are required by animals for resting, feeding, hiding, and reproduction.

FCI Score = [(($V_{buffcon}$ + $V_{buffwid}$) / 2) + ((V_{sed} + V_{wetuse})/2) + V_{canopy}] /3.

Function 8: Maintain Food Web

Use the production of organic matter of sufficient quantity and quality to support energy requirements of characteristic food webs.

FCI Score = ((($V_{buffcon}$ + $V_{buffwid}$) / 2) + $V_{detritus}$ + V_{landsp} + V_{pratio} + V_{sed} + V_{upuse} + V_{wetuse}) / 7.

Function 9: Maintains Habitat Interspersion and Conductivity among Wetlands

Habitat interspersion and conductivity is the spatial distribution of a depressional wetland in relation to nearby wetlands.

FCI Score = [((V_{mod} + V_{upuse} + V_{wetuse}) / 3) x V_{wden}] $^{1/2}$.

Function 10: Maintains Characteristic Invertebrate Community

An invertebrate community is the density and spatial distribution of invertebrates that exploit and contribute to the food web.

FCI Score = (V_{dpond} + V_{fpract} + V_{sprod}) / 3.

Appendix A
Producer Checklist

1. A mitigation site will require a permanent easement for the United States Department of Agriculture (USDA) and a deed restriction to prevent the future loss of the site. Are you willing to accept these terms? If you answer no, then establishing a mitigation site is not possible and you should seek other alternatives for your proposed project.

Yes _____ No _____

2. Do you have a suitable mitigation site located? (Mitigation site should be in same local watershed with similar soils, landscape position, and topography.)

Yes _____ No _____

3. Do you own the mitigation site? Yes _____ No _____
If no, can you obtain easement rights? Yes _____ No _____

4. Who will develop the mitigation plan?

____ Owner/operator
____ A hired consultant
____ Assistance from the Natural Resources Conservation Service will be requested
____ Kansas Department of Wildlife and Parks (KDWP)
____ U.S. Fish and Wildlife Service (FWS)

5. Are you willing to obtain any/all of federal, state, or local permits that apply to this project?

Yes _____ No _____

6. If there are any existing liens on the mitigation site, have you notified those parties of the potential mitigation site?

Yes _____ No _____

NOTE: All costs associated with the construction and maintenance of a mitigation site are the responsibility of the individual or individuals proposing the establishment of such site.

Appendix B(1)
Comparison of the Variable Example by Function

Buffer Zones (V_{buff})

1. Maintains Elemental Cycling Logic - Logging, grazing, burning, tillage, development, and drainage activities in the buffer zone impact plant communities and elemental cycling throughout the wetland ecosystem.

2. Removal of Imported Elements and Compounds Logic - Grazing, burning, tillage development and drainage activities in the buffer zone impact the delivery of elements and compounds to the wetland.

3. Exports Organic Carbon and Detritus Logic - Grazing, burning, tillage development and drainage activities in the buffer zone impact the timing rate and quality of discharge to the wetland.

4. Maintains Habitat Structure Within Wetlands Logic - Logging, grazing, burning, tillage, development, and drainage activities in the wetland buffer zone impact the wetland. Disturbance of the buffer zone reduces protective cover.

5. Maintains Food Web Logic - Logging, grazing, burning, tillage, development, and drainage activities in the wetland buffer zone impact the wetland.

Detritus ($V_{detritus}$)

1. Hydrologic Regime Logic - In combination with other roughness factors (V_{micro}, V_{pden}) roughness will result in a slowing of water flow (contributing to dynamic storage).

2. Removal of Imported Elements and Compounds Logic - Provides increased surface area for microbial processing of nutrients.

3. Exports Organic Carbon and Detritus Logic - In combination with other roughness factors (V_{micro}, V_{pden}) roughness will result in a slowing of water flow provide increased time and surface area for processing and export of organic carbon.

4. Maintains Food Web Logic - The detritus provides a source of organic carbon to the wetland. It also provides surface area for microbes plus resting and escape cover for invertebrates and vertebrates.

Microtopographic Roughness (V_{micro})

1. Hydrologic Regime Logic - In combination with other roughness factors (V_{pden}, $V_{detritus}$) roughness will result in a slowing of water flow contributing to dynamic storage.

2. Removes Dissolved Elements and Compounds Logic - In combination with other roughness factors (V_{pden}, $V_{detritus}$) roughness will result in a slowing of water flow (contributing to dynamic storage) and provide increased surface area for microbial processing and removal of nutrients..

Appendix B(2)
Comparison of the Variable Example by Function

Microtopographic Roughness (V_{micro}), continued

3 Exports Organic Carbon and Detritus Logic - In combination with other roughness factors (V_{pden}, $V_{detritus}$) roughness will result in a slowing of water flow and provide increased time and surface area for processing and export of organic carbon.

Wetland Outlet and Excavation (V_{mod})

1. Hydrologic Regime Logic - Changes in the water surface elevation impact the static and dynamic surface water storage

2. Elemental Cycling Logic - Outlets provide for the transport of elements and compounds to off-site ecosystems

3. Removal of Imported Elements and Compounds Logic - Outlets provide vectors for the transport of elements and compounds to off-site ecosystems

4. Retention of Particulates Logic - Changes in outlet elevation can affect the degree to which particulates will be retained or exported.

5. Exports Organic Carbon and Detritus Logic - Changes in outlet elevation can affect the degree to which particulates will be retained or exported.

6. Maintains Characteristic Plant Community Logic - Changes in the water surface elevation can impact the maintenance of saturation in the wetland which affects the plant community.

7. Maintains Habitat Interspersion and Connectivity among Wetlands - Changes in the water surface elevation can; 1) alter the surface connections among wetlands, 2) change productivity and habitat structure, and 3) change hydro-period, and, therefore, wetland class.

Plant Density (V_{pden})

1. Hydrologic Regime Logic - In combination with other roughness factors (V_{micro}, $V_{detritus}$) roughness will result in a slowing of water flow contributing to dynamic storage.

2. Removal of Imported elements and Compounds Logic - The abundance of plants provides increased surface area for microbial processing of nutrients.

3. Exports Organic Carbon and Detritus Logic - In combination with other roughness factors (V_{micro},$V_{detritus}$) roughness will result in a slowing of water flow and provide increased time and surface area for processing and export of organic carbon.

Appendix B(3)
Comparison of the Variable Example by Function

Sediment Delivery to the Wetland (V_{sed})

1. Hydrologic Regime Logic - The rate of sediment delivery to the wetland basin will affect the storage capacity of the wetland.

2. Elemental Cycling Logic - Accelerated deposition can be a vector for P and other nutrients and contaminants.

3. Removal of Imported Elements and Compounds Logic - Too much sediment can override wetlands ability to process nutrients

4. Retention of Particulates Logic -The rate of sediment within the wetland basin can affect the capacity of the wetland to retain particulates.

6. Maintains Characteristic Plant Community Logic - The rate of sediment delivery to the wetland basin can affect the ability of the wetland basin to maintain native plant communities.

7. Maintain Habitat Structure within Wetland Logic - The rate of sediment delivery to the wetland basin can affect the population and diversity of native plant communities.

8. Maintain Food Webs Logic - The rate of sediment delivery to the wetland basin can affect the capacity of the wetland basin to maintain native plant and invertebrate communities.

Upland Land Use (V_{upuse})

1. Hydrologic Regime Logic - Measurement of the water quality the watershed contributes to the wetland.

2. Retention of Particulates Logic - None to moderate disturbances of perennial native vegetation yields the least overland flow and aeolian deposited sediment. Thus, it does not contribute to filling the wetland depression.

3. Maintain Food Webs - Upland land use can affect how organisms move within and between wetlands.

4. Habitat Interspersion and Connectivity among Wetlands Logic - Upland land use can affect how organisms move within and between wetlands.

Appendix B(4)
Comparison of the Variable Example by Function

Wetland Land Use (V_{wetuse})

1. Hydrologic Regime Logic - Disruption of the wetland by tillage affects soil water movement (i.e. compaction).

2. Elemental Cycling Logic - Disturbance of the wetland impairs the ability of biotic processes to uptake and release elements.

3. Removal of Imported Elements and Compounds Logic - Land uses in the wetland affect the capacity of the wetland to maintain native plant populations.

4. Retention of Particulates Logic - If an outlet is present, increasing the level of disturbance within the wetland impacts the rate particulates are retained or exported

5. Exports Organic Carbon and Detritus - If an outlet is present, wetland land use determines the degree to which particulates are retained or exported due to roughness.

6. Characteristic Plant Community Logic - Disturbance in the wetland can have an influence on the maintenance of characteristic plant communities.

7. Habitat Structure within Wetland Logic - Upland land use can affect how organisms move within and between wetlands.

8. Food Webs Logic - Land uses in the wetland affect habitat features directly through interaction of vegetation composition, horizontal and vertical structure, and productivity.

9. Habitat Interspersion and Connectivity among Wetlands Logic - Land uses in the wetland affect the capacity of the wetland to maintain native plant and faunal populations.

Appendix C(1)
Variables with Index Values

Model Variable	Buffer Zone ($V_{buffcon}$) Continuity Measurement or Condition	Index
Definition: Percentage of buffer zone surrounding the wetland.	Continuity is >90 percent	1.0
Example: Grazing, burning, tillage, development, and drainage activities in the buffer zone impact plant communities and elemental cycling throughout the wetland ecosystem.	Continuity is 75 to 90 percent	0.75
	Continuity is 50 to 74 percent	0.5
	Continuity is 25 to 49 percent	0.25
	Continuity is less than 25 percent	0.0

Model Variable	Buffer Zone Width ($V_{buffwid}$) Measurement or Condition	Index
Definition: Condition of the buffer zone adjacent to the wetland.	Relatively undisturbed with evidence of surface water movement to the wetland. Minimum of 100 feet wide buffer with native perennial vegetative cover.	1.0
Example: Grazing, burning, tillage, development, and drainage activities in the buffer zone impact plant communities and elemental cycling throughout the wetland ecosystem.	Some disturbance with indications of water movement to the wetland. Buffer 50 to 99 feet wide undisturbed with native perennial vegetative cover.	0.5
	Some disturbance with indications of water movement to the wetland. Buffer with 10 to 49 feet wide with perennial vegetative cover.	0.25
	Disturbances with indications of high rate of run-off with a buffer width of less than 10 feet.	0.0

Model Variable	Canopy Cover (V_{canopy}) Measurement or Condition	Index
Definition: Canopy cover of each stratum in each plant community.	The measurement of canopy cover is $\geq$ 75 percent in each stratum present.	1.0
Example: Measure of change in strata from reference site. Changes in strata impact quality of wetland.	The measure of canopy cover is $\leq$ 75 or > 125 percent of the comparison sites in oe stratum of a plant community.	0.5
	The measure of canopy cover is 0 - 75 percent of comparison sites in two strata of a plant community.	0.25
	Vegetation is sparse or absent.	0.0

Appendix C(2)
Variables with Index Values

Model Variable	Tree Density and Basel Area (V_{denba}) Measurement or Condition	Index
Definition: The density and basal area of trees.	The measure of tree density and basal area is > 75 percent of the reference standard conditions.	1.0
Example: Changes in forested plant community impact several wetland functions.	The measure of tree density and basal area is > 25 - 75 percent of the reference standard conditions.	0.5
	The measure of tree density and basal area is > 0 - 25 percent of the referenced standard conditions.	0.10
	The measure of tree density and basal area is 0 percent of the reference standard conditions.	0.0

Model Variable	Detritus ($V_{detritus}$) Measurement or Condition	Index
Definition: The presence of litter, small woody debris, and large woody debris on the wetland surface that contributes to roughness.	Litter and/or woody debris is > 3 centimeters thick.	1.0
Example: In combination with other roughness factors ($V_{micro,}$ V_{pden}) roughness will result in a slowing of water flow, contributing to dynamic storage.	Litter and/or woody debris is 1 to 3 centimeters thick.	0.5
	Litter and/or woody debris is < 1 centimeter thick.	0.1
	Litter and/or woody debris is absent.	0.0

Model Variable	Duration Ponding (V_{dpond}) Measurement or Condition	Index
Definition: Ponding must be present long enough for a invertebrate species to complete it's life cycle.	28 days or greater ponding or 75 - 100 percent using hydrology tools.	1.0
Example: Bloodworms require approximately 21 days to reproduce.	21 - 27 days or 50 to 74 percent using hydrology tools.	0.75
	14 - 20 days or 25 - 49 percent using hydrology tools.	0.5
	7 - 13 days or 24 percent using hydrology tools.	0.25

Appendix C(3)
Variables with Index Values

Model Variable	Farming Practices (V_{fpract}) Measurement or Condition	Index
Definition: Farming practices and the quantity of insecticides applied annually affect invertebrate populations in agricultural wetlands.	Range, pasture, and/or permanent vegetation.	1.0
Example: Practices which decrease the application of pesticides increase the populations of invertebrates.	Continuous wheat, wheat - fallow, wheat - sorghum - fallow, wheat - milo rotations.	0.75
	Corn - soybeans or corn - sorghum rotations.	0.5
	Continuous corn or continuous sunflowers.	0.25

Model Variable	Landscape (V_{landsp}) Measurement or Condition	Index
Definition: Condition of landscape within a 1 mile radius of center of the wetland being assessed.	Surrounding landscape supports $\geq$ 75 percent mosaic of natural plant community.	1.0
Example: Conditions of landscape in vicinity of wetland determines the quality of potential dispersal area and home range for fauna that depend upon a mosaic of wetland and upland habitats.	Surrounding landscape supports 50 to 75 percent mosaic of natural plant community.	0.5
	Surrounding landscape supports 25 to 50 percent mosaic of natural plant community.	0.1
	Surrounding landscape supports less than 25 percent mosaic of natural plant community.	0.0

Model Variable	Microtopographic Roughness (V_{micro}) Measurement or Condition	Index
Definition: Microtopographic relief that contributes to surface roughness, abrupt site water balance variation on the wetland surface, and surfaces for microbial activity.	Microtopographic relief present in 75 to 100 percent of wetland assessment area.	1.0
Example: In combination with other roughness factors (V_{pden}, $V_{detritus}$) roughness will result in a slowing of water flow contributing to dynamic storage.	Microtopographic relief present in 51 to 75 percent of wetland assessment area.	0.75
	Microtopographic relief present in 25 to 50 percent of wetland assessment area.	0.50
	Microtopographic relief present in < 25 percent of wetland assessment area.	0.25

Appendix C(4)
Variables with Index Values

Model Variable	Modifications (V_{mod}) Measurement or Condition	Index
Definition: Presence of constructed excavations (concentration pits or trenches), constructed outlets, or fill which affect water paths and duration of ponding and/or saturation in the wetland.	No excavations or constructed outlet/fill in the wetland.	1.0
Example: Excavations in the wetland alter flow paths within the wetland, concentrate water in confined areas, reduce durations of wetness, and may allow loss of water through the substrate.	Pits and/or other man-made excavations within the wetland do not hold more than 10 percent of the total water volumn, AND/OR bottom of constructed outlet(s) is at least 2 feet above the bottom elevation of the wetland.	0.75
	Pits and or other man-made excavations within the wetland do not hold more than 25 percent of the total water volumn, AND/OR bottom of constructed outlet(s) is at least 1 foot above the bottom elevation of the wetland.	0.50
	Pits and or other man-made excavations within the wetland do not hold more than 50 percent of the total water volumn, AND/OR Bottom of constructed outlet(s) is at least 8 inches above the bottom elevation of the wetland.	0.10

Model Variable	Plant Density (V_{pden}) Measurement or Condition	Index
Definition: Density of woody and herbaceous plants.	Density 75 to 125 percent of reference standard.	1.0
Example for Hydrology Model: In combination with other roughness factors (V_{micro}, $V_{detritus}$), roughness will result in a slowing of water flow contributing to dynamic storage.	Density 25 to 75 percent or > 125 percent of comparison sites.	0.5
	Density 0 to 25 percent of comparison sites.	0.25
	Plants absent.	0.0

Appendix C(5)
Variables with Index Values

Model Variable	Soil Pores and Structure (V_{pore}) Measurement or Condition	Index
Definition: The physical quality of the soil above the Bt[1] horizon. This includes detailed criteria as defined in the Soil Survey Manual for cracks, clods, structure, rupture resistance, roots, and non-matrix pores.	Many fine and very fine roots AND/OR many fine and/or very fine, continuous tubular pores with medium to high vertical continuity AND moderate or strong, medium and coar	1.0
Example: These soil properties indicate surface area for soil water contact and, therefore, increased surface area for microbial activity.	Common fine and very fine roots AND/OR common fine and/or very fine, continuous and discontinuous tubular pores with medium to low vertical continuity AND weak or moderate, medium and/or fine angluar or subangular blocky structure and/or weak or moderate	0.5
	Few fine and very fine roots, AND/OR few fine and/or very fine, discontinuous tubular pores with low vertical continuity, AND weak or coarse subangular blocky structure or soil is structureless (massive or single grain)	0.1
	Substrate is a non-porous medium, such as asphalt or concrete.	0.0

[1]Subsurface horizon with illuvial accumulation of silicate clay

Appendix C(6)
Variables with Index Values

Model Variable	Ratio of Native/Non-native Plant Species (V_{pratio}) Measurement or Condition	Index
Definition: The ratio of native to non-native plant species within the wetland as indicated by the top four dominants or by a more extensive species survey.	All the dominant species in all zones are native species that are listed as reference standard species for zones within the wetland.	1.0
Example: The presence of a high ratio of native to non-native plant species indicates that disturbances that interrupt naturally occurring cycles and other vegetative dynamics are minimal.	75 to 100 percent of the species are native species.	0.75
	Two of the four dominant species in all zones are native species that are listed as reference standard species for the same zone within the reference domain and/or 50 to 75 percent of the species surveryed are native species.	0.5
	One of the four (25 percent) of the dominant species in all zones are native species that are listed as reference standard species for the same zone within the reference domain and/or 25 to 50 percent of the species surgeyed are native species.	0.25
	None of the four most abundant species in all zones are native species that are listed as reference standard species for the same zone within the reference domain and/or 0 to 25 percent of the species surveyed are native species.	0.1
	Temporary zone unvegetated.	0.0
Characteristc plant communities are not dominated by exotic or nuisance species. Vegetation is maintained by mechanisms such as seed dispersal, seed banks, and vegetative propagation which all respond to variations in hydrology and disturbances such as f		

Appendix C(7)
Variables with Index Values,

Model Variable	Sediment Delivery to Wetland (V_{sed}) Measurement or Condition	Index
Definition: Extent of sediment accumulation within the wetland from culturally accelerated sources.	Less than 1 inch sediment delivery with no deltas, plumes, etc., in areas of concentrated flow in temporary zone.	1.0
Example: Sedimentation levels will affect native plants and invertebrates. Visual sedimentation has a different color (lighter) and/or texture than the original surface layer.	Sediment delivery is evidenced by sediment staining of detritus and/or slight accumulations of sediment along plant stems in the temporary zone (1 to 3 inches)	0.5
	Sediment delivery is evidenced by buried detritus and/or vegetation on wetland edge. Recent deltas, sediment plumes, etc., in areas of concentrated flow (4 to 6 inches).	0.1
	Bottom elevation of wetland raised due to sedimentation and/or infilling due to tillage (> 6 inches). Logically, filled basins rate a 0.0	0.0

Model Variable	Source Area Flow Interception (V_{source}) Measurement or Condition	Index
Definition: Presence of alteratons to landscape which affect flow paths and rates of water to the wetland.	Contributing drainage area of wetland reduced by less than 10 percent	1.0
Example: Alterations to the contributing wateshed impact surface and subsurface flow to the wetland.	Contributing drainage area of wetland reduced by less than 25 percent.	0.75
	Contributing drainage area of wetland reduced by less than 50 percent.	0.5
	Contributing drainage area of wetland reduced by less than 75 percent.	0.25
	Watershed source area altered such that almost all water flow to wetland eliminated.	0.0
Parameters might include: linear feet of road ditches, linear feet of terraces, volumn (area) of excavated pits, acres irrigated cropland, and proximity to irrigation canal. **Stop here if the depression is closed. Use (V_{micro}+V_{pden}+$V_{detritus}$) if the wet**		

Appendix C(8)
Variables with Index Values

Model Variable	Soil Productivity (V_{sprod}) Measurement or Condition	Index
Definition: Soil texture influences the diversity of species found at a site.	Coarse loamy and loamy - moderately coarse and medium textured (very fine sandy loam, fine sandy loam, loam, sandy loam, silt loam).	1.0
Example: Medium textured soils have the potential for the greatest diversity of species.	Fine loamy - moderately fine textured (clay loam, sandy clay loam, silty clay loam < 34 percent clay).	0.75
	Sandy - coarse textured (sand, fine sand, loamy sand, loamy fine sand).	0.5
	Clayey - fine textured and sodic affected soils (sandy clay, silty clay, clay, silty clay loam > 34 percent clay).	0.25

Model Variable	Upland Land Use (V_{upuse}) Measurement or Condition	Index
Definition: Dominant land use and condition of upland watershed that contributes to the wetland.	Forested and/or native prairie, 90 - 100 percent canopy cover.	1.0
Example: Medium textured soils have the potential for the greatest diversity of species.	Annual and perennial cover, 60 - 90 percent canopy cover.	0.75
	No-till farming, conservation tillage, good residue management, no fall tillage.	0.5
	Conventional tillage, residues buried, fall tillage, and furrow irrigation with rows up - down slope into wetland assessment area (WAA).	0.25
	Point and/or non-point pollution from semi-pervious or impervious surface. (If BMP's[2] employed, the impact may be somewhat less.	0.0

Appendix C(9)
Variables with Index Values

Model Variable	Wetland Land Use (V_{wetuse}) Measurement or Condition	Index
Definition: Dominant land use and condition of the wetland.	Wetland not tilled in last five years. Temporary zone intact.	1.0
Example: Distruption of the wetland by tillage affects soil water movement, such as compaction).	Wetland rarely (< = 2/10) cropped, minimal impact from grazing and/or haying.	0.75
	No tillage in zones wetter than temporary zone. Temporary zone minimally impacted by moderate grazing, haying, or tillage.	0.5
	Weltand receives minimal tillage in seasonal and wetter zones; temporary zones tilled or heavily grazed most years. Zones wetter than temporary zone intact.	0.25
	Wetland received conventional tillage in all zones in most year; if recently tilled, evidfence of vegetation, clods in furrow, etc.	0.1
	Wetland more severly disturbed than indicated above (no vegetation, rutted, feed lot, urban fill, etc.).	0.0
Temporary zone (zone of vegetation affected by capillary water. Hydrophytic vegetation still predominates.		

Model Variable	Density of Wetlands in the Landscape (V_{wden}) Measurement or Condition	Index
Definition: The absolute density of wetlands in a given water regime within the defined boundary of the wetland subclass.	At least 6 wetlands within a two mile radius.	1.0
Example: Wetland landscapes often support many wetlands of different types (temporary, seasonal, and semi-permanent). The density and pattern of different types of wetlands in the landscape is related to how animals use them and hence their contribution	5 wetlands within a two mile radius.	0.75
	3 to 4 wetlands within a two mile radius.	0.5
	2 wetlands within a two mile radius.	0.25
	There is only wetland within a two mile radius.	0.0

Appendix F:
Instructions for filling out Excel Workbook for Interim Kansas Depressional HGM Model

At the bottom of the workbook are the Excel spreadsheets associated with this model. They are to be used for documenting minimal effects determinations and mitigation using the HGM assessment method.

CALCULATION SHEETS

1) **Min (Minimal) Effects sheet**
   This sheet is a stand alone calculation sheet used to determine if the alterations to a wetland site fall within the minimal effects criteria.

2) **Impacted Site sheet**
   This sheet requires inputs for a wetland conversion that requires mitigation to replace lost Functional Capacity Indices (FCIs) and Functional Capacity Units (FCUs).

3) **Mitigation Site sheet**
   This sheet requires inputs for the mitigation site that is being used to replace the lost FCUs for the impacted site.

4) **FCU Change sheet**
   This sheet shows the data inputs for the impacted site sheet and the mitigation site sheet. It does not permit data entry, and shows the acres required to mitigate FCU losses for each function. The minimum/maximum replacement acreage for each function will be according to NRCS policy.

SUPPORT SHEETS

1) **"Flags" sheet:**
   This sheet lists the "yellow flags" and "red flags", as shown in the NFSAM, Part 516, page KS516-2a.
   - Column C cells (C5 – C18) contains the yellow flags abbreviated expression used in the drop-down menu on the minimal effects and mitigation sheets.
   - Column D (cells D5 – D18) contains the yellow flags complete statement listed in the NFSAM.
   - Column F (cells F5 – F9) contains the red flags abbreviated expression used in the drop-down menu on the minimal effects and mitigation sheets.
   - Column G (cells G6 – G8) contains the complete statement listed in the NFSAM.

SUPPORT SHEETS, continued

2) Var (Variable) Field Sheet

This sheet can be printed and used in the field for entering the field variable index rating for each variable in the field. The variable rating values can then be entered in the appropriate spreadsheet.

3) Variables Chart sheet

This sheet is a chart listing all of the variables used in each FCI equation used in the model.

SAVING THE FILE

At the top of any of the sheets in the workbook,

1. click on the "File" option of the menu bar,
2. click on "Save As",
3. in the "Save As" box, find the "Name as" box and enter a file name (for example the Landowner's name),
4. in the "Save In" box at the top of the "Save As" screen, click on the "Down" arrow, and click on the directory/folder that you want the file saved in,
5. click "OK" in the upper right hand portion of the "Save As" screen.

Guidance for Data Entry in the Minimal Effects, Impacted Site, and Mitigation Site sheets

BUTTONS

Each of the three sheets has two buttons in row three at the top of the sheet.

- PRINT — This button prints the contents of the specific sheet
- RESET INPUT — This button clears all of the data entry cells so a new set of data can be entered.

NOTE: *It is recommended that the file be saved per the instructions above before resetting the sheet*

Wetland Area Clarification

- Minimal Effects Site area is listed for area reference. To qualify for Minimal Effects, there cannot be a reduction in wetland area.
- Impacted Site
  - Existing Conditions area is the size of the wetland prior to any alterations in the size and/or functions.
  - Predicted Conditions is the area that remains
    - after any area conversion, and/or
    - impact to functions as a result of changes within the wetland or outside of the wetland
- Mitigation Site area
  - Existing Conditions area is the size of the wetland at the mitigation site prior to any improvements in the size and/or functions. What if the site is not a wetland area?

- o Predicted Conditions is the area as a consequence of restoration, enhancement or creation.

Guidance for Data Entry in the Minimal Effects, Impacted Site, and Mitigation Site sheets continued

MINIMAL EFFECTS SHEET

Data Entry

CELL		
E-F4	DATE	Enter date data collected
E-F5	WETLAND ID	Identification of person(s) for multiple calls per tract
E-F6	OBSERVERS	Person(s) collecting the variable ratings
E-F7	CONDITIONS	Site conditions
E-F8	PROJECT NAME	Name for project (could be landowner, etc.
I-J4	REMARKS	Optional comments
I-J5	ASSESSMENT TYPE	Optional
I-J6	WETLAND TYPE NWI	National Wetland Inventory name (optional)
I-J7	**"Closed' or 'Throughflow"**	**Required DROP-DOWN MENU entry** to address flow conditions of wetland
I-J8	OWNER/OPERATOR	Name of person(s) being assisted
E-K9	PLANNED ACTIVITY	Brief description of proposed practice
E-F10	**YELLOW FLAG**	**DROP-DOWN MENU**
H-I10	**RED FLAG**	**DROP-DOWN MENU**
H-J12	**"Wooded' or 'Non-wooded"**	**Required DROP-DOWN MENU entry** to address vegetative conditions of wetland
E17	WETLAND AREA	Area of wetland to 0.001 acres
D20-D38	EXISTING CONDITIONS	Enter index ratings for each of the variables (index rating day before alteration)
H20-H38	PREDICTED CONDTIONS	Enter predicted post-project index ratings for each variable
H-J47 to H-J51	COMMENTS	Comments that help clarify function result

IMPACTED SITE SHEET (location generating need for mitigation)

Data Entry

CELL		
E-F4	DATE	Enter date data collected
E-F5	WETLAND ID	Identification of person(s) for multiple calls per tract
E-F6	OBSERVERS	Person(s) collecting the variable ratings
E-F7	CONDITIONS	Site conditions
E-F8	PROJECT NAME	Name for project (could be landowner, etc.
J-K4	REMARKS	Optional comments
J-K5	ASSESSMENT TYPE	Optional
J-K6	WETLAND TYPE NWI	National Wetland Inventory name (optional)
J-K7	**"Closed' or 'Throughflow"**	**Required DROP-DOWN MENU entry** to address flow conditions of wetland
J-K8	OWNER/OPERATOR	Name of person(s) being assisted
E-K9	PLANNED ACTIVITY	Brief description of proposed practice
E-G10	**YELLOW FLAG**	**DROP-DOWN MENU**
I-J10	**RED FLAG**	**DROP-DOWN MENU**
J-K12	**"Wooded' or 'Non-wooded"**	**Required DROP-DOWN MENU entry** to address vegetative conditions of wetland
E17	WETLAND ACRES E	Existing wetland (just prior to conversion) to nearest 0.001 acres
I 13	WETLAND ACRES P	Remaining wetland (after conversion) to nearest 0.001 acres *[this is not restoration acreage]*
E20-G22		
	COPY MINIMAL EFFECTS VARIABLES BUTTON	Transfers the "existing conditions" Copies variable ratings from the "minimal effects" sheet to "the impacted site" sheet
D20-D38		
	EXISTING CONDITIONS	Enter index ratings for each of the variables (index rating day before alteration)
I 20-I 38		
	PREDICTED CONDTIONS	Enter predicted post-project index ratings for each variable for remaining wetland area
H-K52 toH-K61		
	COMMENTS	Comments that help clarify function result

MITIGATION SITE SHEET (location used for mitigation of FCU's lost)

Data Entry

CELL		
E-F4	DATE	Enter date data collected
E-F5	WETLAND ID	Identification of person(s) for multiple calls per tract
E-F6	OBSERVERS	Person(s) collecting the variable ratings
E-F7	CONDITIONS	Site conditions
E-F8	PROJECT NAME	Name for project (copied from Impacted Site sheet)
J-K4	REMARKS	Optional comments
J-K5	ASSESSMENT TYPE	Optional
J-K6	WETLAND TYPE NWI	National Wetland Inventory name (optional)
J-K7	**"Closed' or 'Throughflow"**	**Required DROP-DOWN MENU entry** to address flow conditions of wetland
J-K8	OWNER/OPERATOR	Name of person(s) being assisted
E-K9	PLANNED ACTIVITY	Brief description of proposed practice
E-F10	**YELLOW FLAG**	**DROP DOWN MENU**
I-J10	**RED FLAG**	**DROP DOWN MENU**
J-K12	**"Wooded' or 'Non-wooded"**	**Required DROP-DOWN MENU entry** to address vegetative conditions of wetland
E17	WETLAND ACRES E	Existing wetland (just prior to conversion) to nearest 0.001 acres
I 13	WETLAND ACRES P	Remaining wetland (after conversion) to nearest 0.001 acres *[this is not restoration acreage]*
D20-D38	EXISTING CONDITIONS	Enter index ratings for each of the variables (index rating day before alteration)
I 20-I 38	PREDICTED CONDTIONS	Enter predicted post-project index ratings for each variable for remaining wetland area