

TECHNICAL NOTES

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Idaho Interim Functional Assessment for Low-gradient
Broad Basin, Groundwater Fed, Slope Wetlands with Spring Fed
Riverine Inclusion

File this in the Biology section of the Technical Notes, Section VI of the Technical Guide

Idaho Interim Functional Assessment for Low-gradient
Broad Basin, Groundwater Fed, Slope Wetlands with Spring Fed
Riverine Inclusion

April 1999

Prepared By The

Idaho Wetland Functional Assessment Committee

Mabel Jankovsky-Jones, Committee Leader

DISCLAIMER

This interim functional assessment model is based upon expert opinion and existing other functional assessments being developed for the subclass (National Slope Team, No Date; Utah Assessment Team, No Date). The model has only limited field testing and has not been calibrated with real data. The model is meant to serve as an interim tool and may be revised based on field use and as other information becomes available.

Idaho Interim Functional Assessment for Low-gradient
Broad Basin, Groundwater Fed, Slope Wetlands with Spring Fed
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This functional assessment model has been developed to be used as an interim procedure to assess wetland functions pertaining to USDA producer requests for wetland manipulations as they relate to minimal effect and mitigation. Policy is described in the Third Edition, Amendment 2, November 1996 of USDA Natural Resources Conservation Service's National Food Security Act Manual.

This functional assessment model can also be used to assess wetland functions pertinent to applications for Department of the Army permits under Section 404 of the Clean Water Act as they relate to wetland impacts and mitigation.

COMMENTS FROM THE COMMITTEE

This committee was charged with development of an interim wetland function assessment procedure to implement the Wetland Provisions of the 1996 Federal Agricultural Improvement Reform Act of 1996 and Section 404 of the Clean Water Act. It was the desire of the committee to use Hydrogeomorphic (HGM) Evaluation Principles when developing the interim procedures. It should be understood by users of this model that the committee recognizes that some wetland functions are not adequately represented in this interim model, and thus, limitation on some projects and sites will occur. Furthermore, users should be aware that this is not an HGM model; rather, it is an interim assessment procedure to be utilized by Natural Resources Conservation Service (NRCS) and Army Corp of Engineers (ACOE) until HGM models are developed. However, for the vast majority of conversions within the defined wetland subclass, the committee is confident that this model will adequately assess wetland function losses and provide a basis for determining appropriate mitigation as well as assisting in quantifying threshold limits associated with NRCS minimal effect determinations.

The interim model was developed by an interagency committee consisting of:

| | |
|---|---|
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Interim Functional Assessment Idaho

Subclass: Low-gradient, broad basin, groundwater fed slope with spring fed riverine inclusion

Introduction:

This subclass includes montane, low-gradient slope wetlands where the primary water source is groundwater. The slope wetlands occur in broad valleys in mountainous regions of central and eastern Idaho where mineral and organic soils on alluvial sand and gravel deposits typically overlay an impermeable surface. Perennial streams draining the mountains may become intermittent when they reach the alluvial valleys. This water then percolates into the groundwater system and surfaces in the valley bottoms.

This assessment was field tested at two locations in the Silver Creek Valley of central Idaho. Examples of other areas of the state where it can be applied include the Teton Valley, Upper Birch Creek, Texas Creek (headwaters of the Lemhi River), Summit Creek (headwaters of the Little Lost River), Upper Pahsimeroi Valley, spring-fed wetlands near Blackfoot Reservoir, and wetlands surrounding Henrys Lake.

Functional Profile

Geomorphic Setting:

The mountains of central and eastern Idaho are within the Northern Rocky Mountains Steppe and Southern Rocky Mountains Steppe provinces. The Northern Rocky Mountain Steppe in Idaho includes the Yellowstone Highlands (M331A) and Overthrust Mountains (M331 D) (including the Teton Basin) sections. The Southern Rocky Mountains Steppe in Idaho includes the Idaho Batholith (M332A), Bitterroot Valley (M332B), Beaverhead Mountains {M332E), and Challis Volcanics (M3 32F) (McNab and Avers 1 994). Broad intermontane valleys are typically thrust faulted and filled with glacio-fluvial, alluvial fan, or colluvial deposits (Bond 1978). Valley soils are silt loams and silty clay loams that are generally deep to moderately deep, poorly drained, and have low permeability in the upper soil profile with high permeability in underlying gravel and sand. Slightly acidic peat soils may develop and are usually composed of herbaceous plants (U.S. Department of Agriculture Soil Conservation Service 1991). Adjacent mountain ranges frequently have carbonate and limestone deposits (Bond 1978). Mineral soils are often mildly to strongly calcareous due to precipitation of these deposits and water chemistry may be mildly to strongly alkaline.

Parent Materials:

Fine textured fluvial materials typically overlay restrictive layers such as basalt or other volcanic flows deposited on Paleozoic lake sediments of limestone, siltstone, and sandstone. The alluvial materials of the valley floor are of mixed origin and may be derived from granite, gneiss, sandstone, quartzite, limestone, or rhyolite (U.S. Department of Agriculture Soil Conservation Service 1969).

Ecological significance of geomorphic setting:

The water holding capacity is high to very high in upper profiles of both the mineral and organic soils. The upper profiles range from 20-72 inches in depth and are underlain by a permeable

sand and gravel layer. During the spring, run-off from snowmelt is stored on the soil surface and later moves into the upper profile. The water eventually leaves the system via channels or via underflow through sands and gravels (U.S. Department of Agriculture Soil Conservation Service 1991, 1969).

Calcareous soils are typically highly to strongly alkaline. Organic peat soils in slope wetlands are moderately to slightly acidic. Rare plant species are associated with water chemistry at the extremes of the pH scale (Rabe et al. 1994, Bursik and Moseley 1995). Wetlands of this subclass are floristically rich and frequently provide habitat for plant species of concern.

Functions based on geomorphic setting:

Deep surface soils underlain by permeable sands and gravels result in functions related to storage and movement of water including: (1) surface and subsurface water storage, and (2) moderation of groundwater. Water chemistry of these wetlands often results in unique assemblages of plant species.

Water Source and Climatic Setting:

Winter and spring weather patterns are influenced by westerly winds from the Pacific Ocean. This maritime influence weakens during summer months and continental climatic conditions prevail with air masses from the south producing thunderstorm activity. Climate is considered semi-arid with average annual precipitation in the 9 to 24 inch range. Most of the precipitation is in the form of snow during the winter months (Ross and Savage 1967).

Perennial streams draining the mountain systems may become intermittent when they reach the valleys. The water percolates through the groundwater system and surfaces in valley bottoms (Rabe et al 1994). Lesser amounts of water enter the system from direct precipitation in the form of snow.

Ecological significance of water source and climatic setting:

Water quality in these wetlands is high providing habitat for aquatic vertebrates and invertebrates. Throughout Idaho spring fed wetlands have been found to provide habitat for endemic fish and snail species. Streams of these wetlands are often important sport fisheries due to the abundance of invertebrates and optimal water temperatures.

Functions based on water source and climatic setting:

Because the dominant source of water for low-gradient slope wetlands is groundwater, the wetlands function to maintain habitat for aquatic species.

Hydrodynamics:

The hydrograph of groundwater fed wetlands in mountainous regions of Idaho may experience two pulses. The broad valleys where these wetlands occur typically have accumulations of snow during the winter months. A peak in flow in the early spring occurs due to snow melt. The flows

are then level and may pulse again in the fall due to lag time in percolation from the mountains, underflow from the ground watershed, or in response to the end of irrigation (Wiley 1977). Overbank flows that occur in most stream systems associated with spring run-off are typically lacking (Rabe et al. 1994). Rather, the wetland complex becomes inundated when the soil profile becomes saturated.

Water entering sloped wetland systems is stored in areas of low topographic relief, in the soil profile, and on the surface. Nearly all of the water leaves the system through surface run-off in spring channels. Lesser amounts may be lost to evapotranspiration and underflow. Portions of the wetland mosaic with shallow surface soils are only temporarily flooded.

Ecological significance of hydrodynamics:

The poorly drained soils of this wetland subclass are saturated throughout the growing season and plant productivity is high. A diverse mosaic of native plant communities, including scrub-shrub, forested, and emergent vegetation is correlated with duration of flooding in this subclass. Scrub-shrub vegetation occurs in association with somewhat poorly drained soils lining spring channels. Willows or water birch are dominant scrub-shrub species and are habitat for neotropical migrants, moose, and deer. Soils that dry out seasonally (temporarily flooded) support scrub-shrub vegetation dominated by low shrubs including shrubby cinquefoil and greasewood. Forested vegetation is typically dominated by aspen and may become established on former spring heads. The aspen stands are known to contain bald eagle nests and heron rookeries. Emergent vegetation occurring on very poorly drained soils is dominated by sedges, rushes, and cattails. Temporarily flooded emergent vegetation is dominated by grasses and sedges (Idaho Conservation Data Center 1997). Semipermanently flooded and open water habitat provide habitat for amphibians. Water is frequently open during winter months and may provide habitat for wintering waterfowl including trumpeter swans. Temporarily flooded emergent and scrub-shrub wetlands provide habitat for sandhill cranes and foraging areas for harriers and great gray owls (Groves et al. 1997). Areas that are temporarily flooded are accessible to humans and livestock and subject to alterations from agricultural conversion, grazing, and development.

Functions based on hydrodynamics:

The distribution of plant communities throughout the wetland is a result of hydrodynamics. In addition to habitat functions, the mosaic of emergent, scrub-shrub, forested, and open water habitat results in functions related to storage and accumulation of organic and inorganic sediments as well as elements and compounds.

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Interim Functional Assessment Functions and Variables Idaho

Subclass: Low-gradient, broad basin, groundwater fed slope with spring fed riverine inclusion

| Variables | Functions | | | | | | |
|-----------|---------------------|------------------------|-------------------------|--------------------------------|---|---|--|
| | Surface H2O storage | Subsurface H2O storage | Removal of particulates | Moderation of groundwater flow | Maintain characteristic plant community | Maintain habitat for native aquatic invertebrates and vertebrates | Maintain characteristic bird populations |
| Vfreq | X | | X | | | | |
| Vmicro | X | | X | | | | |
| Vpore | | X | | | | | |
| Vwtf | | X | | | | | |
| Vpden | | | X | | | | |
| Vlanduse | | | | | | X | X |
| Vwetuse | | | X | | X | X | |
| Vlitter | | | X | | | | |
| Vmacro | | | X | | | | |
| Vbuff | | | X | | X | | |
| Vsubin | | | | X | | | |
| Vsubout | | | | X | | | |
| Vpdom | | | | | X | | |
| Vregen | | | | | X | | |
| Vratio | | | | | X | X | |
| Vmosaic | | | | | | X | X |
| Vlink | | | | | | X | |
| Vstrata | | | | | | | X |
| Vbirduse | | | | | | | X |

**Variables for assessment of wetland functions
in low-gradient, broad basin, groundwater fed slope with spring fed riverine inclusion**

Area Assessed: _____ Date: _____

Surveyor (s) _____ Purpose: Conversion
 Mitigation

| Model Variables | Indicators | | Pre-Rating | Post-Rating |
|---|--|-----|--------------------|-------------|
| | | | Comments and Notes | |
| Vfreq: frequency of water above soil surface | Frequent (more than once in two years) flooding as indicated by field observation, series of air photos or soil survey. | 1.0 | Pre | Post |
| | Flooding occasional (once or less in two years) or common (flooding likely under normal conditions) as indicated by series of air photos or soil survey. | 0.5 | | |
| | Flooding rare (not possible except under usual weather conditions) as indicated by series of air photos or soil survey. | 0.1 | | |
| | No evidence or indicators of flooding. | 0.0 | | |
| Vmicro: Micro-topographic relief | >50% of the wetland with topography which stores topographic relief surface water. Indicators include swales or other areas with low topographic relief which allow water to be stored or hummocks which allow water to flow in rills. | 1.0 | Pre | Post |
| | 25-50% of wetland with topography which stores surface water. Indicators include swales or other areas with low topographic relief which allow water to be stored or hummocks which allow water to flow in rills. | 0.5 | | |
| | 1-25% of the wetland with topography which stores surface water. Indicators include swales or other areas with low topographic relief which allow water to be stored or hummocks which allow water to flow in rills. | 0.1 | | |
| | Wetland flat and water essentially flows as a sheet. | 0.0 | | |
| Vpore: soil pore space available for storage | Higher permeability wetland soils (sandy loam to coarser texture soil) and soil not saturated to surface nor ponded for long durations during growing season. | 1.0 | Pre | Post |
| | Lower permeability wetland soils (soil texture finer than sandy loam) and soil not saturated to surface or ponded for long durations during growing season. | 0.5 | | |
| | Soil saturated to surface or ponded for long durations during the growing season | 0.1 | | |
| | Soil saturated to surface or ponded throughout year. | 0.0 | | |

| | | | | | | |
|---|--|-----|-----|------|-----|------|
| Vwtf: Fluctuation of water table | Water table falls rapidly to 15-30 cm of surface. | 1.0 | Pre | Post | | |
| | Water table tails slowly and/or to a depth of 15 cm | 0.5 | | | | |
| | Soils stay nearly saturated or fluctuate within a few cm of surface over several days to a week | 0.1 | | | | |
| | Soil saturated to surface throughout the year or water table at 30 cm or greater for long periods. | 0.0 | | | | |
| Vmacro: Macrotopo- graphic relief | Evidence of macrotopographic features: natural levees, oxbows, meander scrolls, breaks in slope. | 1.0 | Pre | Post | | |
| | No evidence of macrotopographic features. | 0.0 | | | | |
| Vpden: Cover of plants | Herbaceous plants with 50% or greater cover. | 1.0 | | | Pre | Post |
| | Herbaceous plants with 10-50% cover. | 0.5 | | | | |
| | Little cover present, but sparse (< 10% cover). | 0.1 | | | | |
| | No plants present. | 0.0 | | | | |
| Vlitter: Herbaceous plant detritus (uptake and conversion of nutrients) | Litter density (75-125%) of reference standard- Litter with 50% to continuous cover. Open water <10% of wetland area. | 1.0 | Pre | Post | | |
| | Litter density (25-75%) of reference standard- Litter with 10-50% cover. Open water 10-25% of wetland area. | 0.5 | | | | |
| | Litter density (0-25%) of reference standard- Litter cover present, but sparse (<10% cover). Open water >25% of wetland area. | 0.1 | | | | |
| | No litter present or area dominated by open water. | 0.0 | | | | |
| Vwetuse: Dominant land use and condition | Wetland is part of an acre or larger block of land which is non-fragmented and has few non-natural breaks. If some agricultural uses (e.g. haying, grazing) occur in the wetland and surrounding landscape, no compaction from equipment or evidence of trampling. | 1.0 | Pre | Post | | |
| | No tillage in saturated wetlands. Outermost zone minimally impacted by light grazing. | 0.5 | | | | |
| | Wetland receives conventional tillage; outermost zone tilled or grazed. | 0.1 | | | | |
| | Wetland severely disturbed by tillage, grazing, and/or water development. Restoration potential questionable and will require replanting and hydrologic restoration | 0.0 | | | | |
| Vbuff:Zone surrounding the wetland that protects structural and functional integrity | Buffer is in native vegetation with almost no disturbance | 1.0 | Pre | Post | | |
| | Buffer is in native vegetation with light to moderate grazing. | 0.5 | | | | |
| | Buffer receives conventional tillage or is in non-native monoculture. | 0.1 | | | | |
| | Urban, semi-pervious, or impervious surfaces immediately adjacent to the site. | 0.0 | | | | |

| | | | | |
|--|---|-----|-----|------|
| Vsubin: Subsurface flow into wetland | Seeps present at edge of wetland. Springs within wetland. Saturated soils present during entire year. Gleyed or organic soils present. Vegetation dominated by FACW or OBL species. Low permeability soils present. | 1.0 | Pre | Post |
| | Soils meet hydric criteria and are saturated to surface during the entire growing season. Vegetation is dominated by FACW or drier species. Moderately permeable soils present. | 0.5 | | |
| | No seeps present at wetland edge. No springs in wetland. Soils meet hydric criteria but not saturated to surface during entire growing season. Soils not gleyed. Vegetation dominated by FAC or drier species. | 0.1 | | |
| | Above indicators absent. | 0.0 | | |
| Vsubout: Surface flow from wetland to other surficial aquatic environment | Subsurface and surface flow from wetland to offsite aquatic environment throughout the year. Offsite aquatic environment (creek or stream) within 0.25 miles of wetland. Low gradient in wetland (0-0.5%). | 1.0 | Pre | Post |
| | Subsurface and surface flow from wetland to offsite aquatic environment throughout growing season. Offsite aquatic environment (creek or stream) within 0.25-0.5 miles from wetland. | 0.5 | | |
| | Subsurface and surface flow from wetland to offsite aquatic environment for part of growing season. Offsite aquatic environment greater than 0.5 miles from wetland. High gradient in wetland 2.0% or greater. | 0.1 | | |
| | Above indicators absent. | 0.0 | | |
| Vpdom: number of dominant (>10% cover) wetland plant species | Dominant wetland plant species is > 8 | 1.0 | Pre | Post |
| | Dominant wetland plant species is 5-7 | .75 | | |
| | Dominant wetland plant species is 3-4 | 0.5 | | |
| | Dominant wetland plant species is 1-2 | .25 | | |
| | Site devoid of vegetation | 0.0 | | |
| Vregen: Herb, shrub, and tree species as seedling/ sapling and/or clonal shoots with mature seeds | Obvious seedling/sapling, clonal shoots, or mature seeds dominated by native wetland species. | 1.0 | Pre | Post |
| | Some seedling/sapling and/or clonal shoots native and non-native species | 0.5 | | |
| | Significant regeneration by non-native species and/or increasers; soil disturbance activities. | 0.1 | | |
| | No seedling/sapling and/or clonal shoots present. | 0.0 | | |

| | | | | |
|--|---|-----|-----|------|
| Vratio: ratio of native and non-native plant species | 3 of the 4 most abundant plant species in the wetland are native species and/or 74-100% of the species surveyed are native species. | 1.0 | Pre | Post |
| | 2 of the 4 most abundant plant species in wetland are native species and/or 50-73% of species surveyed are native species. | .75 | | |
| | 1 of 4 most abundant plant species in wetland is native species and/or 25-50% of species surveyed are natives. | 0.5 | | |
| | None of the 4 most abundant plant species in the wetland are native species; however, at least 1-25% of the species surveyed are native species. | 0.1 | | |
| | Riparian corridor and floodplain unvegetated or dominated by planted or escaped cultivars | 0.0 | | |
| Vmosiac: number and proportion of cover types within the wetland | Wetland includes 3 or more vegetation classes based on Cowardin's classification or 3 or more cover types within a single vegetation class. | 1.0 | Pre | Post |
| | Wetland includes 2 or more vegetation classes based on Cowardin's classification or 2 or more cover types within a single vegetation class. | 0.5 | | |
| | Vegetation absent, a monoculture, or essentially a single plant community with little diversity. | 0.1 | | |
| | Vegetation as above with little possibility of restoration or consisting of planted cultivars. | 0.0 | | |
| Vlink: proximity and connectivity to other wetlands in the area | Wetland is adjacent to or connected to other wetlands within a mile radius via subsurface or surface flows (including channels) which have not been altered by diversion, channel straightening, conversion, or grazing. | 1.0 | Pre | Post |
| | Wetland is connected to other wetlands within a mile radius via subsurface or surface flows (including channels). Wetlands may be impacted by grazing and conversion but hydrologic manipulations are minor and not fragmenting connectivity. | 0.5 | | |
| | Wetland connectivity is fragmented by periphery ditches or channelization. Adjacent wetlands are impacted by grazing, conversion, or development | 0.1 | | |
| | Wetland is isolated from adjacent wetlands due to dewatering (ditches, diversions) or filling. | 0.0 | | |
| Vstrata: number and attributes of vertical strata of vegetation | Dense overstory, with at least 3 vegetative layers. | 1.0 | Pre | Post |
| | Moderately dense overstory with at least 2 layers. Mix of shrub vegetation near emergent habitat. | 0.5 | | |
| | Overstory with at least 1 layer. No shrub vegetation near emergent habitat. | 0.1 | | |
| | No overstory. No shrub vegetation or emergent habitat. | 0.0 | | |

| | | | | |
|---|--|-----|-----|------|
| Vlanduse: dominant land use and condition of upland watershed that contributes to wetland | Uplands never grazed or at most infrequently and lightly grazed. Never tilled. | 1.0 | Pre | Post |
| | Surrounding upland in combination of land uses in which there is moderate grazing on steep and long slopes and/or tillage on short and moderate slopes | 0.5 | | |
| | Moderate tillage or heavy grazing on high slopes. | 0.1 | | |
| | Urban, semi-pervious, or impervious surfaces resulting in maximum overland flow and high sediment delivery rate to wetland. | 0.0 | | |
| Vbirduse: number of species using the area within the wetland | Wetland used by 10 or more species of birds. Use nests, calls, tracks, feathers, skeletons, and field sightings. | 1.0 | Pre | Post |
| | Wetland used by 5 to 10 species of birds. | 0.5 | | |
| | Wetlands used by less than 5 species of birds. | 0.1 | | |
| | No bird use evident. | 0.0 | | |

Additional notes:

DEFINITION OF FUNCTIONS AND FUNCTIONAL INDEX WORKSHEETS

HYDROLOGIC FUNCTIONS

Function: SURFACE WATER STORAGE

Definition: Storage of water on the surface of the wetland.

Effects On-Site: Maintains hydric soils and wetland plant species.

Effects Off-Site: Capture of ground and surface water to maintain water delivery to downstream sources throughout growing season. Stores and retains particulates to maintain water quality.

| Condition | INDICES OF VARIABLES | | Functional Capacity Index; If $V_{freq}=0$ then $FCI=0$; otherwise $FCI=(V_{freq} + V_{micro})/2$ |
|--------------|----------------------|-------------|--|
| | V_{freq} | V_{micro} | |
| Pre-project | | | |
| Post-project | | | |
| Comments | | | |

Function: SUBSURFACE WATER STORAGE

Definition: Ability of a wetland to store subsurface water. Availability of storage for water beneath the wetland surface. Storage capacity becomes available as periodic drawdown of the water table or reduction in soil saturation occurs, making drained pores available for storage of water. Drawdown may be the result of vertical and lateral drainage and/or evapotranspiration.

Effects On-site: Maintains biogeochemical processes.

Effects Off site: Recharge surficial aquifers and maintain baseflow and seasonal flow in streams.

| Condition | INDICES OF VARIABLES | | Functional Capacity Index = $(V_{pore} + V_{wtf})/2$ |
|--------------|----------------------|-----------|--|
| | V_{pore} | V_{wtf} | |
| Pre-project | | | |
| Post-project | | | |
| Comments | | | |

BIOGEOCHEMICAL FUNCTIONS

Function: REMOVAL OF PARTICULATES

Definition: Process of filtering and settling both organic and inorganic particulates.

Effects On-site: Sediment accumulation contributes to the nutrient capital of an ecosystem. Deposition increases surface elevation and changes topographic complexity. Organic matter may also be retained for decomposition, nutrient recycling, and detrital food web support.

Effects Off site: Constituents that undergo removal and concentration in the wetland, regardless of source, reduce downstream loading. Reduces stream sediment load and entrained woody debris that would otherwise be transported downstream.

| Condition | INDICES OF VARIABLES | | | | | | | Functional Capacity Index = $(V_{freq} + V_{macro} + V_{pden} + V_{litter} + V_{wetuse} + V_{buff})/7$ |
|--------------|----------------------|--------|--------|-------|---------|---------|-------|--|
| | Vfreq | Vmacro | Vmicro | Vpden | Vlitter | Vwetuse | Vbuff | |
| Pre-project | | | | | | | | |
| Post-project | | | | | | | | |
| Comments | | | | | | | | |

Function: MODERATION OF GROUNDWATER FLOW

Definition: Capacity of wetland to moderate the rate of groundwater flow by interception. Water is then discharged into down gradient sources.

Effects On-site: Maintain saturated soil conditions throughout the growing season.

Effects Off site: Maintain upgradient or upslope groundwater storage and groundwater table.

| Condition | INDICES OF VARIABLES | | Functional Capacity Index = $(V_{subbasin} \times V_{subout})^{1/2}$ |
|--------------|----------------------|---------|--|
| | Vsubin | Vsubout | |
| Pre-project | | | |
| Post-project | | | |
| Comments | | | |

HABITAT FUNCTIONS

Function: MAINTAIN CHARACTERISTIC NATIVE PLANT COMMUNITY

Definition: Capacity of a wetland to produce and support characteristic native plant communities. (Emphasis is on location, dynamics and structure of plant community within slope wetland and mosaic of similar wetlands in the area. This is controlled by the dominant species of tree, shrubs, and ground cover and by the characteristics of vegetation regeneration).

Effects On-site: Converts solar radiation and carbon dioxide into complex organic compounds that provide energy to drive food webs. Provides seeds and propagules for regeneration. Provides habitat diversity for nesting, resting, refuge, and escape cover for animals. Creates microclimatic conditions that support completion of life histories of plants and animals. Creates roughness that reduces velocity of flood waters. Provides organic matter for soil development and soil related nutrient cycling processes. Created both long-term and short-term habitat for resident or migratory animals.

Effects Off site: Provides a source of seeds and propagules to maintain species composition and/or structure of adjacent wetlands and supplies propagules for colonization of nearby degraded systems. Provides food and cover for animals from adjacent ecosystems. Contributes to landscape connectivity, habitat, and food for migratory species. Enhances species diversity and ecosystem stability. Organic matter supports secondary production in associated aquatic ecosystems. Contributes leaf litter and coarse woody debris habitat for animals in associated aquatic habitats.

| Condition | INDICES OF VARIABLES | | | | | Functional Capacity Index = $((V_{pdom} + V_{regen} + V_{buff} + V_{wetuse})/4 \times (V_{ratio}))^{1/2}$ |
|--------------|----------------------|--------|-------|---------|--------|--|
| | Vpdom | Vregen | Vbuff | Vwetuse | Vratio | |
| Pre-project | | | | | | |
| Post-project | | | | | | |
| Comments: | | | | | | |

Function: MAINTAIN HABITAT FOR NATIVE AQUATIC INVERTEBRATES AND VERTEBRATES

Definition: Capacity of the wetland to support characteristic aquatic animal population.

Effects On-site: Maintain both aquatic and terrestrial foodwebs by providing animal tissue.

Effects Off site: Support food webs of organisms that utilize other wetlands or are migratory.

| Condition | INDICES OF VARIABLES | | | | | Functional Capacity Index = (Vratio + Vmosaic + Vlink + Vlanduse + Vwetuse)/5 |
|--------------|----------------------|---------|-------|----------|---------|---|
| | Vratio | Vmosaic | Vlink | Vlanduse | Vwetuse | |
| Pre-project | | | | | | |
| Post-project | | | | | | |
| Comments: | | | | | | |

Function: MAINTAIN CHARACTERISTIC BIRD POPULATIONS

Definition: Abundance and species richness of birds is related to habitat complexity because birds evolved to fill most available terrestrial niches. They partition habitats temporally (day versus night feeders), spatially (ground feeders, mid- and top-canopy feeders), and trophically (frugivores, insectivores, and piscivores). Birds are sensitive to alterations in structure and function of wetland ecosystems. Species richness and relative abundance can be measured. Bird richness increases with: vegetation/open water interspersions, increased layers of vegetation, and complexes of small and diverse wetlands.

Effects On-site: Maintain habitat for birds that has characteristic species composition, abundance, and structure containing diversity, nesting, resting, refuge, and escape cover.

Effects Off site: Maintain corridors between habitat islands and landscape biodiversity.

| Condition | INDICES OF VARIABLES | | | | Functional Capacity Index = (Vstrata + Vmosaic + Vbirduse + Vlanduse)/4 |
|--------------|----------------------|---------|----------|----------|---|
| | Vstrata | Vmosaic | Vbirduse | Vlanduse | |
| Pre-project | | | | | |
| Post-project | | | | | |
| Comments | | | | | |

Worksheet for Calculating Mitigation Acres Required

Area Assessed:

Date:

Surveyor (s)

| Function | Loss due to conversion | | | Mitigation site: before construction/ restoration/ manipulation | | | | Mitigation site: after construction/ restoration/ manipulation | | | | (12) Uncertainty Factor ≥ 1 | (13) Final Acreage |
|---|------------------------|-------------|------------|--|-------------|------------|---|---|-------------|-------------|--|--|--------------------------|
| | (1) FCI | (2) Area | (3) FCU | (4) Initial FCI | (5) Area | (6) FCU | (7) Target FCU = (Col. 3 + Col. 6) | (8) Planned FCI | (9) Area | (10) FCU | (11) FCU Gained = (Col. 10 - Col. 7) | | |
| Surface water storage | | | | | | | | | | | | | |
| Subsurface water storage | | | | | | | | | | | | | |
| Removal of particulates | | | | | | | | | | | | | |
| Moderation of groundwater flow | | | | | | | | | | | | | |
| Maintain characteristic plant community | | | | | | | | | | | | | |
| Maintain habitat for native aquatic invertebrates and vertebrates | | | | | | | | | | | | | |
| Maintain characteristic bird populations | | | | | | | | | | | | | |

CHART NOTES

FCI = Functional capacity Index; FCU = Functional Capacity Units

Column 1: FCI after conversion = (Pre-project FCI - Post-project FCI)

Columns 4,8: FCI for mitigation site for pre- and post-mitigation. For column 4, FCI = 0 if creation site.

Columns 2,5,9: Area of the wetland or mitigation site being assessed.

Columns 3,6,10: FCU=FCI x Area

Column 7: Target FCU = Column 3 + Column 6; this is your project goal to create or restore a wetland equal to this FCU

Column 11: Column 10 - Column 7; if this = 0 then functions are replaced; if > 0 then functions are exceeded; if < 0 then functions are not replaced and mitigation site is not adequate. If mitigation is inadequate choose another site (or additional acres) and begin calculation in column 4.

Column 12: Option to include Uncertainty factor (≥ 1) to account for lag time and scientific uncertainty.

Column 13: Final mitigation acreage = Mitigation Area X Uncertainty Factor (Column 9 x Column 12).

FCU Comments: