4.4.7 (Non-Forested) Wetland Group

4.4.7.1 Overview

Wetland communities have a common characteristic - their soil is periodically saturated with or covered by water. A wetland is defined in the *Wisconsin Statutes* as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions".

Wetlands form where the shape of the land is conducive to retaining water, including flat areas or depressions with limited outflow, where groundwater is present at the land surface, and in floodplains with water flow-through. Wetlands can sometimes form in unlikely places, such as on slopes, when the local climate produces continually wet conditions (Verry 1988). Landscape features and other variables that vary from site-to-site will influence both ecological function and plant and animal diversity.

Wetlands are part of the water cycle of all ecosystems, and their location in the landscape allows them to function as a buffer between upland areas and surface waters (Weller 1981). Wetlands perform a number of natural functions that benefit natural ecosystems and society. Water quality is often dependent upon wetlands because they serve to trap sediment, remove nutrients, protect shorelines, and slow the effects of flood water. They also serve as both discharge and recharge areas for groundwater and provide habitat for many species of plants and animals (Stearns 1978). In part due to these functions, wetlands exhibit higher biological productivity than most other community types, and support rare biota. Forty-three percent of all federally-listed threatened and endangered species use wetlands at some point in their life cycles (Feierabend 1992). In Wisconsin, 32% of the state's listed species are wetland dependent. Further loss or degradation of wetlands would affect a disproportionate share of Wisconsin's rare species. Table 4.4.7.1 provides the number of SGCNs estimated to have a high or moderate association with this community group.

Disturbance and other factors have opened many wetlands to invasion by non-native invasive species that can reduce the ecological value of wetlands. Descriptions for the wetland community types can be found online except for floating-leaved marsh and riverine mudflat, which are described in Appendix 4.3.[1]

The Wetland Group includes the following community types:

- Alder Thicket
- Bog Relict
- Boreal Rich Fen
- Calcareous Fen
- Central Poor Fen

[1] http://dnr.wi.gov/topic/EndangeredResources/Communities.asp?mode=group&Type=Wetland (Search Terms: Wetland Communities Wisconsin DNR)

- Coastal Plain Marsh
- Emergent Marsh
- Emergent Marsh-Wild Rice
- Ephemeral Pond
- Floating-leaved Marsh
- Interdunal Wetland
- Moist Sandy Meadow
- Muskeg
- Northern Sedge Meadow
- Open Bog
- Patterned Peatland
- Poor Fen
- Riverine Mudflat
- Shore Fen
- Shrub-carr
- Southern Sedge Meadow
- Submergent Marsh
- Submergent Marsh – Oligotrophic

Several of the natural communities listed here are closely related to some of the natural communities present in the Aquatic Group. Specifically, the submergent aquatic and emergent aquatic natural communities or their variants (i.e., emergent aquatic-wild rice and submergent aquatic-oligotrophic) could potentially be present in all of the aquatic communities. In addition, communities such as wet prairie could fit here, but for the purposes of the WWAP are included in the Grasslands Group.

Table 4.4.7.2 at the end of this Section provides the Natural Community – Ecological Landscape (NC-EL) Opportunity scores for the Southern Forest Community Group. The key to these scores is provided below.

Key to NC-EL Opportunity Scores

Level of Opportunity	Description
High	A major opportunity for sustaining the natural community in the Ecological Landscape exists, either because many significant occurrences of the natural community have been recorded in the landscape or restoration activities in areas of historical occurrence are likely to be successful maintaining the community's composition, structure, and ecological function over a long period of time.
Moderate	Although the natural community does not occur extensively or commonly in the Ecological Landscape, one to several significant occurrences do occur and are important in sustaining the community in the state. In some cases, important opportunities may exist because the natural community may be restricted to just one or a few Ecological Landscapes within the state and should be considered for management there because of limited geographic distribution and a lack of better opportunities elsewhere.
Low	The natural community occurs in the Ecological Landscape, but better management opportunities appear to exist in other parts of the state.
None	The natural community is not known to occur in this Ecological Landscape.

4.4.7.2 Issues and Associated Conservation Actions for the Wetland Community Group

This Section describes the issues and voluntary conservation actions that are common to all or most of the community types in this group. As much as possible, the threat or source of the threat is described as well as the stresses or effects that occur directly or indirectly as a result of the threat. Stresses are generally thought of as loss, conversion and/or degradation of the natural community.

Issue. Wisconsin has lost 47% of its original ten million acres of wetlands since Euro-American settlement. Many of the remaining 5.3 million acres are in the northern third of the state (Wisconsin DNR 1990). In some southern Wisconsin counties, the amount of wetland loss is well over 75%. Wisconsin's losses are reflective of the national status of wetlands; it is estimated that one-half of the nation's original 221 million acres of wetlands have been lost (Feierabend 1992). A large amount of remaining acreage in Wisconsin exists in a partly altered state, such as with old drainage ditches still functional enough to change the hydrology of the wetland. Much of this remaining wetland acreage was at one time disturbed, either by drainage (followed by restoration) or by being cleared, repeatedly burned, grazed, or periodically plowed (Curtis 1959). Loss of wetlands adversely affects a wide range of wetland functions, from wildlife habitat to water quality to flood storage.

Conservation Actions. Depending on your overall objectives, the following conservation actions can address habitat fragmentation and the effects that it has on non-forested wetland natural communities:

- Continue to work on priorities and strategies identified in "Reversing the Loss" wetland restoration action plan.
- Incorporate SGCN and their habitat as well as conservation actions and opportunity areas into the identification of restorable wetlands for the Wisconsin Wetland Conservation Trust.
- Minimize land use conflicts and improve wetland conservation at the local level by implementing recommendations in Wisconsin Wetlands Association's "Land Use and Wetlands: Zoning Opportunities to Improve Wetland Protection."
- Maintain and restore native plant communities within the 100 year floodplain along rivers and streams.
- Target wetland restoration, enhancement, and preservation of priority areas identified through Wisconsin Watershed Approach to Wetland Functional Assessment.

Issue. Water, and the hydrologic regime that characterized each site, is the life blood of wetlands. Direct hydrologic alteration of wetlands through dams, ditching, draining, or filling causes severe habitat alteration that changes the function and value of a site, often lowering habitat quality for many species. Water levels that are artificially raised can flood out diverse marshes, fens, and sedge meadows, causing native plants to be replaced by monotypic stands of cattails or simply open water. Ditches and drain tiles lower the water table, facilitating tree and shrub invasion and loss of open wetland. habitat, while filling simply eliminated wetlands altogether. Indirect alteration can occur from things such as the construction of new roads can disrupt hydrology,

impounding water on one side of a road while causing drying on the other. At a more local scale, unsustainable timber harvesting or recreational vehicle use on sensitive soils can cause soil compaction and rutting. Finally, overuse of groundwater resources for agriculture, municipal, or industrial use can cause a lowering of the water table, starving groundwater fed-wetlands of the source of their existence.

Conservation Actions. Depending on your overall objectives, the following conservation actions can address soil disturbance and hydrologic alteration and the effects that it has on wetland natural communities:

- Follow forestry best management practices for water quality, especially near riparian areas, and consider additional buffers around sensitive wetland habitats.
- Develop habitat management guidelines for Ephemeral Ponds to protect water quality, pond hydrology, and habitat for herptiles and invertebrates.
- Limit hydrological alteration to wetlands as an unintentional consequence of development/road building.
- Identify priority groundwater recharge areas that supply fens, sedge meadows, springs, streams, and other wetlands and conduct groundwater quality and quantity monitoring in regions with high demand on groundwater resources.

Issue. Nutrient enrichment and sedimentation are one of the leading causes of wetland degradation. Excess nutrients, usually in the form of nitrogen and/or phosphorus, favor non-native invasive species (e.g., reed canary grass) and aggressive native species (e.g., cat-tails) which displace native plants. Nutrients can come from a variety of sources, ranging from agricultural fields to lawns. In addition, nitrogen accumulates through atmospheric deposition, mainly due to the burning of fossil fuels. Sedimentation is also problematic, and can arise from unsustainable agricultural practices on steep slopes or near waterways, land-clearing activities, unsustainable timber harvest operation, and poorly designed road crossings at streams or wetlands. Overall, sedimentation increases water turbidity and can cover low-lying plants in silt. Following water quality BMPs greatly reduces the risk from these activities; however, climate change may add complexity to this issue as severe precipitation events are projected to increase and the season of frozen ground conditions grows shorter.

Conservation Actions. Depending on your overall objectives, the following conservation actions can be considered to address nutrient enrichment and sedimentation and the effects that they can have on wetland communities:

- Follow water quality best management practices, especially near riparian areas, and consider additional buffers around sensitive wetland habitats.
- Work with municipal planners, developers, businesses, and local zoning boards to increase groundwater infiltration practices and decrease stormwater input and nutrient enrichment of water from impervious surfaces (parking lots, etc.) through techniques such as the installation of bioswales, etc.
- Implement Wisconsin's Nonpoint Source Program Management Plan FFY 2011-2015 and subsequent updates, which addresses impacts from non-point source pollution and provides direct and indirect benefits to SGCNs and their habitats. Work with NRCS Conservationist or follow NRCS guidelines to develop a 'cropland

conservation management system' for water quality and water quantity that holistically considers the effects of planting design, crop selection, discontinuous vegetative cover, tillage practices, nutrient management, pest management, and irrigation.

Issue. Invasive species displace native plants and associated animals, lower species diversity, alter structural diversity (such as the ratio of open water pools to vegetation, abundance and distribution of sedge tussocks, etc.) and alter nutrient cycling. The most problematic non-native invasive species in open wetlands include well-established plants such as reed canary grass, narrow-leaved and hybrid cat-tail, purple loosestrife, and non-native Phragmites, as well as more recent, rapidly spreading invaders like Japanese hops. Invasive species are often exacerbated by soil disturbance, sedimentation, and nutrient enrichment. Invasive species are expected to increase over time due to both natural spread as well as climate change, as they are able to take advance of longer growing seasons and rapidly respond to disturbances such as large storm events.

Conservation Actions. Depending on your overall objectives, the following conservation actions can address invasive species and the effects that they have on wetland natural communities:

- Maintain open character and limit invasive species and brush invasion in open wetlands and sedge meadows through the use of herbicide, prescribed fire, and other techniques.
- Monitor riparian areas 1-2 years post-flooding for new invasive species.
- Prevent the introduction and spread of invasive species through early detection monitoring and development of a rapid response plan.

Issue. Prior to Euro-American settlement, some open wetland types experienced regular fire, especially communities such as Calcareous Fen, Southern Sedge Meadow, and Coastal Plain Marsh that occur within fire-dependent landscapes. Fire had the effect of setting back woody species, stimulating grasses, sedges, and wildflowers (especially smaller seeded species and annuals), and volatizing excess nitrogen. However, since the early part of the 20th century, fires have been actively suppressed, leading to ecological simplification through shrub encroachment and increased dominance by tall, coarse perennials.

Conservation Actions. Depending on your overall objectives, the following conservation actions can be considered to address fire suppression and the effects that it has on wetland natural communities:

- Focus management and restoration efforts in fire-dependent regions to emphasize open wetlands through techniques such as prescribed fire and brushing.

Issue. Non-forested wetland communities are projected to range from low to high vulnerability to climate change, with vulnerability highly dependent on the type of wetland (Climate Change Vulnerability Assessment Workshops 2014). In general,

potential changes to hydrology are projected to have the greatest impact on wetlands with narrow hydrologic parameters, especially temperature and water level (e.g., fens). Communities adapted to a wider variety of water levels (e.g, sedge meadows) or with the capacity to buffer against small changes (northern peatlands) are projected to have moderate vulnerability, whereas community a high tolerance to variable hydrology and nutrients (e.g., shrub-carr and emergent marsh) are projected to have the lowest vulnerability.

Anticipated hydrologic impacts include increases in extreme precipitation events as well as longer dry periods in between rain events. Large precipitation or snow melt events also increase the risk of invasive species being spread to new areas, increase erosion and sedimentation, and increase nutrient runoff, which further fuels the growth of non-native invasive plants. The impact of these events is likely to be greatest lower in the watershed, where flood waters collect for a longer period of time (Zedler 2009). In addition, increasingly variable winter conditions may impact groundwater infiltration vs. surface runoff as well. Overall, climate change is likely to interact with other stressors such as invasive species, land use changes, and anthropogenic water use to pose a high degree of risk to many wetland communities, with select communities being less vulnerable.

Conservation Actions. Depending on your overall objectives, the following conservation actions can be considered to encourage climate change adaptation for wetland natural communities:

- Restore degraded open wetlands through the control of invasive species, shrubs, and restoration of ecological process such as hydrology and fire.
- Conduct groundwater monitoring in areas where groundwater dependent species and communities are in close proximity to areas with high groundwater withdrawal.
- Reverse wetland losses by restoring converted wetlands to provide storage and filtration and to mitigate storm flows and nutrient loading downstream.
- Increase groundwater infiltration practices and decrease stormwater input and nutrient enrichment of water from impervious surfaces (parking lots, etc.) through techniques such as the installation of bioswales, rain gardens, etc.
- Work with agricultural stakeholders to balance water quality and water quantity with planting design, crop selection, discontinuous vegetative cover, tillage practices, nutrient management, pest management, and irrigation.

Estimated Vulnerability of non-forested wetland communities to climate change under low and high change scenarios.

Community type	Vulnerability under Low degree of climate change	Vulnerability under High degree of climate change
Alder Thicket	Low	Moderately low
Bog Relict	Moderate	Moderately high
Boreal Rich Fen	High	High
Calcareous Fen	High	High
Central Poor Fen	High	High
Coastal Plain Marsh	High	High
Emergent Marsh	Low	Moderately low
Ephemeral Pond	Moderate	High
Interdunal Wetland	Moderate	Moderately high
Moist Sandy Meadow	High	High
Muskeg	Moderate	High
Northern sedge meadow	Moderate	High
Open Bog	Moderate	High
Pattered Peatland	Moderate	High
Poor Fen	Moderate	High
Shore Fen	High	High
Shrub-carr	Low	Moderately low
Southern Sedge Meadow	Moderately high	High

Source: WDNR Climate Change Vulnerability Assessment Workshops 2014.

4.4.7.3 References

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Weller, M.W. 1981. Freshwater Marshes: Ecology and Wildlife Management. University of Minnesota Press, Minneapolis, MN.

Zedler, J. B. (2009). "How frequent storms affect wetland vegetation: a preview of climate-change impacts." Frontiers in Ecology and the Environment 8(10): 540-547.

Table 4.4.7.1 Number of Species of Greatest Conservation Need Highly or Moderately Associated with Non-forested Wetland Communities

SGCN Species Group	(Non-forested) Wetland Community Group
Birds	37
Fish	
Herps	12
Mammals	7
Insects - Aquatic	32
Insects - Terrestrial	14
Invertebrates - Crustacea	
Invertebrates - Mussels	
Invertebrates - Terrestrial Snails	7
Total SGCN (High/Moderate Association)	**109**

Table 4.4.7.2 Natural Community – Ecological Landscape Opportunity Scores for the Non-forested Wetland Community Group

Community	Central Lake Michigan Coastal	Central Sand Hills	Central Sand Plains	Forest Transition	North Central Forest	Northeast Sands	Northern Highland	Northern Lake Michigan Coastal	Northwest Lowlands	Northwest Sands	Southeast Glacial Plains	Southern Lake Michigan Coastal	Southwest Savanna	Superior Coastal Plain	Western Coulee and Ridges	Western Prairie
Alder Thicket	L	M	H	M	H	M	M	L	M	M	L			M	M	L
Bog Relict	L	M									H	M			L	
Boreal Rich Fen					M	M	M	H								
Calcareous Fen		H	L								H	M			L	
Central Poor Fen		L	H													
Coastal Plain Marsh		H	M													
Emergent Marsh	M	H	M	M	H	M	H	H	M	H	H	M	L	H	H	H
Emergent Marsh - Wild Rice	L	L	L	L	M	L	H	L		H	M			H	M	L
Ephemeral Pond	M	L		M	H	L	M	M	L	L	H	M	L	L	L	L
Floating-leaved Marsh	M	H	H	M	H	H	H	H	H	H	H	M	H	M	M	H
Interdunal Wetland	M							M						H		
Moist Sandy Meadow		M	M												M	
Muskeg				M	H	L	H		M	M				M		
Northern Sedge Meadow	M	M	H	M	H	M	H	H	H	H	M			M	M	L
Open Bog	L	M	H	M	H	M	H	L	H	H				H		
Patterned Peatland					M		M				M					
Poor Fen	L	M	H	M	H	M	H	L	H	H	L			H		
Riverine Mud Flat	M	M	L	M	M	L	L	M	L	L	H	M	L	M	H	M
Shore Fen								M						H		

Community	Central Lake Michigan Coastal	Central Sand Hills	Central Sand Plains	Forest Transition	North Central Forest	Northeast Sands	Northern Highland	Northern Lake Michigan Coastal	Northwest Lowlands	Northwest Sands	Southeast Glacial Plains	Southern Lake Michigan Coastal	Southwest Savanna	Superior Coastal Plain	Western Coulee and Ridges	Western Prairie
Shrub Carr	M	H	H	M	M	L	M	H	L	L	H	M	L	M	H	L
Southern Sedge Meadow	M	H	M	L				M			H	M	L		M	L
Submergent Marsh	M	H	M	M	H	M	H	M	M	H	M	L	L	H	H	M
Submergent Marsh - Oligotrophic							H			L						

Appendix 4.3

Wetland Community Descriptions New to the WWAP and Currently Not Presented Online

Floating-leaved Marsh
Riverine Mudflat

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Appendix 4.3
Wetland Community Descriptions New to the WWAP and Currently Not Presented Online

Floating-leaved Marsh
Riverine Mudflat

A4.3.1 Floating-leaved Marsh Overview

The Floating-leaved Marsh community is dominated by aquatic macrophytes with leaves that rest on and cover at least 50% of the water's surface, or which exceed cover values for submersed and emergent macrophytes. Large and small lakes, especially those with irregular shorelines and protected shallow bays, shallow lakes and ponds occupying steep-sided kettle depressions, and the backwaters of large and medium-sized rivers provide the environmental setting for the Floating-leaved Marsh community. Water depths favoring stands of floating-leaved aquatic macrophytes (approximately 7-8 feet) are generally greater than those favored by stands of emergent vegetation, though there can be spatial overlap.

Leaves of the floating-leaved species vary in size and shape, but in many species are round, oval, or heart shaped. The pond lilies have large leaves, and when dominant, can cover virtually the entire surface of the area they occupy; watershield (*Brasenia schreberi*) is particularly successful in doing this in many acidic, shallow marshes. Under such conditions, the heavy shading can inhibit the development of beds of submergent or emergent plants. Some macrophytes, for example long-leaf pondweed (*Potamogeton nodosus*) and floating-leaf bur-reed (*Sparganium fluctuans*), have floating leaves that are narrow or strap-shaped. There is an intermediate stage in the life cycle of wild rice (*Zizania* spp.) when the narrow, strap-shaped leaves are flexible and float on the surface.

Floating-leaved Marsh may occur with other wetland and aquatic communities (especially marshes and sedge meadows) in poorly drained glacial landforms such as till plains and pitted outwash. It also occurs in lagoons protected by sandspits along the Great Lakes shores, especially on Lake Superior. In unglaciated southwestern Wisconsin, the community occurs mostly within the floodplains of the larger rivers, and in impoundments.

A4.3.2 Riverine Mudflat Overview

As riverine water levels drop following spring floods, patches of bare sand, mud, gravel, of cobbles are exposed. The Riverine Mudflat/Beach community is best developed within the floodplains of the state's largest, low gradient rivers, especially in southwestern and central Wisconsin. Soil development on the flats and bars is minimal owing to the frequent flood disturbance. During the growing season these areas are colonized by an assemblage of herbs, and sometimes shrubs and saplings. The mudflats and beaches are highly variable in cover, beginning as basically unvegetated condition in late spring/early summer, to sparsely covered, to locally dense stands of graminoids and forbs by late summer. Usually the vegetation is of short stature.

Significant floods affect this community annually, and these may be accompanied by erosive scouring, sediment deposition, and sometimes (though not always) by shifts in the locations of the bars, mudflats and channels. The colonizing plants tend to be annuals, short-lived perennials, or perennials with light, wind or water dispersed propagules adapted to quickly colonizing unvegetated substrates.

Plants which become established on these newly exposed, somewhat ephemeral habitats include sedges, grasses, and a few woody species such as sandbar willow (Salix exigua) or cottonwood (Populus deltoides). Short graminoids are initially prevalent, such as some of the "flat sedges", for example (Cyperus odoratus and C. squarrosus), spike-rushes (Eleocharis acicularis, E. obtusa, E. palustris), creeping love grass (Eragrostis hypnoides), tufted love grass (E. pectinacea), autumn sedge (Fimbristylis autumnalis), and small-flowered hemicarpha (Lipocarpha micrantha). Other native herbs associated with this assemblage in such habitats are water star-grass (Zosterella dubia), marsh purslane (Ludwigia palustris) and moist bank pimpernel (Lindernia dubia).

In common with other high energy and frequently disturbed environments, such as the beaches and dunes along the Great Lakes, some opportunistic weedy species are also characteristic of riverine mudflats and beaches. However, as the slate is erased virtually every year, these are apparently not problems except in cases where the flood regime has been altered in some way that favors the weeds and development of a weed-dominated community. Examples include green carpetweed (Mollugo verticillata), black mustard Brassica nigra), winged pigweed (Cycloloma atriplicifolia) and Russian thistle (Salsola kali).