New Hampshire Fish and Game Department
Spatial Data Notes

DATA LAYER: Marsh/wet meadow/shrub swamp habitats of New Hampshire
COVER NAME: MARSHES_250COMPLEX
COVER CONTENTS: marsh complexes
COVER TYPE: Poly
SOURCE: NH Natural Heritage Bureau (NHB) marsh complexes.
SOURCE SCALE: 1:24,000
SOURCE MEDIA: digital
COORDINATE SYSTEM: NH State Plane feet, horizontal datum NAD83
TILE: State
AUTOMATED BY: NH Natural Heritage Bureau
STATUS: Complete
LAST REVISION: March 2005; attributes revised December 2009

General Description of the Data

- Development of this coverage provides condition assessment of marsh-wet meadow-scrub shrub wetland complexes within the state of New Hampshire. Analysis was completed for incorporation into the New Hampshire Wildlife Action Plan. Funding for the Plan was provided by State Wildlife Grants administered by the US Fish & Wildlife Service.

- This habitat was initially mapped using the NH Natural Heritage Bureau classification of the emergent marsh-shrub swamp system (Sperduto 2004). National Wetlands Inventory classes were categorized as potentially describing each of the diagnostic communities within this system. For each community, vegetation classes and subclasses were selected that corresponded to the list of plants typically found in that community (Sperduto and Nichols 2004). Hydrologic regimes were selected through consultation with community ecologists (Sperduto and Nichols, pers. comm.) Table 1 lists the subclasses and hydrologic regimes that were ascribed to these communities. Wetlands with certain modifiers were then excluded: g (organic) – this modifier indicates a peatland; a (acidic) – this modifier also indicates a peatland; x (excavated) – anthropogenic changes to the sediment, vegetation and hydrology of these wetlands would likely render them unsuitable; and d (partially drained/ditched) – anthropogenic changes to the hydrology of these wetlands likely render them unsuitable.

Table 1. NWI characteristics potentially associated with natural communities.

Community	Classes/Subclasses	Water Regimes
1) Tall graminoid emergent marsh	EM1; EM	ABCE
2) Northern medium sedge meadow marsh	EM1; EM	ABCE
3) Peaty marsh	EM1; EM	BCE
4) Short graminoid – forb emergent marsh/mud flat	EM1; EM	CEFG
5) Medium-depth emergent marsh	EM2	CEF
6) Deep emergent marsh – aquatic bed	EM; EM1; EM2; EM1/EM2; EM2/EM1; AB/EM; EM/AB; AB/EM1; AB/EM2; EM1/AB; EM2/AB; UB/EM; EM/UB; UB/EM1; UB/EM2; EM1/UB; EM2/UB	EFG
7) Cattail marsh	EM; EM/SS1; EM/SS3; EM/SS; EM1; EM1/SS1; EM1/SS3	CEF
8) Aquatic bed	EM2; AB; EM2/AB; AB/EM2; UB; EM2/UB; UB/EM2; AB/UB; UB/AB	FGH
9) Herbaceous seepage marsh	EM1; EM	BE

10) Mixed tall graminoid – scrub-shrub marsh	EM; EM1; SS; SS1; SS3; EM/SS; EM/SS1; EM1/SS1; EM/SS3; EM1/SS3; SS1/EM; SS3/EM; SS/EM; SS1/EM1; SS3/EM1; SS1/SS3; SS/EM1	ABCE
11) Highbush blueberry – winterberry shrub thicket	SS; SS3; SS1/SS3; SS3/SS1	ACE
12) Buttonbush basin swamp	SS; SS1; SS1/SS3	CEF
13) Alder alluvial shrubland	SS; SS1	ACE
14) Alder – dogwood – arrowwood alluvial thicket	SS; SS1; SS1/SS3	ACE
15) Meadowsweet alluvial thicket	SS; SS1; SS1/SS3; SS1/SS4	ABE
16) Alluvial mixed shrub thicket	SS; SS1	A
17) Meadowsweet robust graminoid sand plain marsh	EM/SS; SS/EM; EM1/SS; SS/EM1; EM1/SS1; SS1/EM1; SS1	CE
18) Meadow beauty sand plain marsh	EM; EM1	CF
19) Three-way sedge – manna grass mud flat	EM; EM/UB; UB/EM; EM1; EM1/UB; UB; UB/EM1; (not UB1 or combinations thereof)	CEF
20) Spike-rush – floating-leaved aquatic mud flat	EM; EM/UB; UB/EM; EM1; EM1/UB; UB/EM1; UB	CFG
21) Sharp-flowered manna-grass shallow peat marsh	EM; EM/UB; UB/EM; EM1, EM1/UB; UB/EM1; UB	EFG
22) Montane sandy basin marsh	EM; EM/SS; EM/SS1; EM/SS3; EM1; EM1/SS1; EM1/SS3	ABCE

- These NWI wetlands were then further restricted through soil analyses. However, these soil restrictions were only for those areas included in the digital NH Soil Units coverage. Thus, wetlands in Belknap and Merrimack Counties as well as the White Mountain National Forest were not restricted by soil types, and marsh/wet meadow/shrub swamp may be overpredicted in these areas. Wetlands on tidal flat organic soils were eliminated. There were relatively few of these, in coastal saltmarsh areas of southeastern New Hampshire. One wetland on peat soil was also eliminated. Wetlands on other organic soils were restricted to communities other than the four sand plain basin marsh communities (communities 17, 18, 19, and 22, which do not have a significant overlying organic layer).

- Wetlands that overlapped known peatlands (from the NHNHB peatbound shapefile) were deleted from this habitat.

- Sandplain basin marshes (communities 17-22) exist only in isolated basins. Thus, only those wetlands that fell within a group of adjacent wetlands that were not adjacent to a stream (from the hydrography layer) and with a total area of 20 acres or less were classed as sandplain basin marsh communities.

- For alluvial wetlands, certain restrictions were made based on proximity to rivers and streams. Wetlands were selected for communities 13, 14 and 15 only if they fell within a complex of suitable wetlands that was <10m from a stream or small river (hydrography layer), or 50m from a major river (U.S. EPA/OW Reach File3). Wetlands were selected for community 16 (which is typically associated only with larger rivers) if they fell within a complex of suitable wetlands that was <50m from a major river.

- Wetlands were selected for herbaceous seepage marshes if they fell on the upland edge of a group of wetlands. Both herbaceous seepage marshes and peaty marshes were restricted to wetlands adjacent to a stream (hydrography layer) or other wetland, which eliminated isolated wetlands from these two communities.

- Montane sandy basin marsh wetlands were restricted to areas above 800ft elevation.
- Most communities were restricted to certain ecoregion subsections (Table 2).

Table 2. Ecoregion subsections associated with each community.

Community	Connecticut Lakes	Mahoosic-Rangely Lakes	White Mountain	Vermont Piedmont	Sunapee Uplands	Northern Connecticut River Valley	Sebago – Ossipee Hills and Plain	Hillsboro Inland Hills and Plains	Gulf of Maine Coastal Plain	Gulf of Maine Coastal Lowland
1) Tall graminoid emergent marsh	X	X	X	X	X	X	X	X	X	X
2) Northern medium sedge meadow marsh	X	X	X							
3) Peaty marsh	X	X		X	X	X	X	X	X	X
4) Short graminoid – forb emergent marsh/mud flat	X	X	X	X	X	X	X	X	X	X
5) Medium-depth emergent marsh	X	X	X	X	X	X	X	X	X	X
6) Deep emergent marsh – aquatic bed	X	X	X	X	X	X	X	X	X	X
7) Cattail marsh	X	X		X	X	X	X	X	X	X
8) Aquatic bed	X	X	X	X	X	X	X	X	X	X
9) Herbaceous seepage marsh	X	X		X	X	X	X	X	X	X
10) Mixed tall graminoid – scrub-shrub marsh	X	X	X	X	X	X	X	X	X	X
11) Highbush blueberry – winterberry shrub thicket					X	X	X	X	X	X
12) Buttonbush basin swamp					X	X	X	X	X	X
13) Alder alluvial shrubland	X	X	X	X	X	X	X	X	X	
14) Alder – dogwood – arrowwood alluvial thicket	X	X	X	X	X	X	X	X	X	X
15) Meadowsweet alluvial thicket	X	X	X	X	X	X	X	X	X	X
16) Alluvial mixed shrub thicket	X	X	X	X	X	X	X	X	X	X
17) Meadowsweet – robust graminoid sand plain marsh							X		X	X
18) Meadow beauty sand plain marsh									X	
19) Three-way sedge – manna-grass mud flat							X		X	
20) Spike-rush – floating-leaved aquatic mud flat							X		X	
21) Sharp-flowered manna-grass shallow peat marsh									X	
22) Montane sandy basin marsh	X	X	X				X			

- Other shrubby and emergent wetlands that were not classed as one of the Natural Heritage communities were added to the shapefile if they were predominantly SS, SS6 or SS1 (with SS, SS6 or SS1 listed first) or predominantly EM, EM1 or EM2 (with EM, EM1 or EM2 listed first). However, of these wetlands, those mixed with unconsolidated shore (US) or with SS4, SS2, FO4, or FO2 (likely peatland vegetation) were excluded.
- Wetlands were classed as shrub, emergent, or mixed using the criteria in Table 3. The “mixed” category refers to emergent/woody mixes that are not predominantly forested. Other classes beginning with SS were classed as “shrub,” and other classes beginning with EM, UB or AB were classed as “emergent.” Mixes of emergent vegetation with dead forest or shrub were classed as emergent, because with the death of the woody vegetation, these wetlands will typically become entirely emergent.

Table3. Criteria for classifying wetland structure.

Category	***Vegetation Classes***
Shrub	SS, SS/UB, SS/FO
Emergent	EM, UB, AB, EM/UB, UB/EM, EM/AB, AB/EM, UB/AB, AB/UB, EM/FO (for FO5 only), EM/SS (for SS5 only)
Mixed	SS/EM, EM/SS (not SS5), EM/FO (not FO5)

- Several other wetland categories were added to the map. These are not marsh/wet meadow/shrub swamp specifically, but generally contribute to this habitat overall in the landscape. Wetlands that were predominantly SS5 and FO5 were included, as dead vegetation likely would be useful habitat. Predominantly FO1 wetlands mixed with any EM, with SS1 or with FO5 were added in. Solely FO1 wetlands with a beaver modifier were included. Wetlands with UB or UB combined with FO1, SS1, or EM, and with a hydrologic regime of H or F, were added in. Wetlands with primary vegetation subclasses of EM1, SS1, or FO5, and secondary vegetation subclasses of FO4 or SS4, AND which had a beaver modifier were included. All of these wetlands were classed as "Other" in the "shrub, emergent, mixed" category.

- Wetlands were dissolved based on their "type" attribute – emergent, shrub, mixed, and other, to create a new layer, Marshes_type.

- Wetlands were merged into complexes to create a second new layer, Marshes_250complex, with the criterion that a complex consisted of wetlands separated by no more than 250m. Wetlands initially within the same complex but with a major route (from the Routes layer) between them were assigned to different complexes. In a few cases, a wetland slightly overlapped a route, due to differences in spatial accuracy between the layers. In these cases, the wetland was not split, but was assigned to the complex in which most of the wetland fell.

Potential Errors in the Data

National Wetlands Inventory classifications may be erroneous, particularly in underestimating peatlands (resulting in an overabundance of peatlands incorrectly included in this habitat). Water regimes can be incorrect as well. However, incorrect water regimes would not influence whether a wetland was included overall; rather it would only influence whether the wetland was assigned the proper community classification within the shapefile.

Soil Units data were only available for part of the state, excluding Merrimack and Belknap counties as well as the White Mountains. Thus, any elimination of wetlands using soil data did not occur in these regions, so the habitat may overpredict in these regions.

Community classification based on proximity to other wetlands, streams or rivers may have errors depending on the spatial accuracy of all hydrologic data. Any polygons or lines that are not correctly located in the layer could result in incorrect assumptions about proximity to other water bodies. This does not affect whether a wetland is included overall, but it does influence which communities the wetland may be assigned to.

Item definitions for MARSHES_250COMPLEX polygon attributes:

ITEM NAME	DESCRIPTION .
ID250	Sequential number assigned to buffer polygons
ACRES	Area of the complex (acres)
HECTARES	Area of the complex (hectares)
NUM_MARSH	Number of marsh polygons in the complex
E_AREA_HA	Hectares of emergent type marsh in the complex
S_AREA_HA	Hectares of shrub type marsh in the complex
M_AREA_HA	Hectares of mixed type marsh in the complex
O_AREA_HA	Hectares of other type marsh in the complex

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Item definitions for MARSHES_250COMPLEX polygon attributes: (continued)

ITEM NAME	DESCRIPTION
VEG_RICH	Number of dominant NWI vegetation classes in the complex
HYDRO_RICH	Number of dominant NWI vegetation classes in the complex
KM_MARSH	Distance to nearest marsh complex (km)
KM_ROUTE	Distance to nearest major transportation route (km)
FGID	unique sequential ID assigned by NHFGD
AREA_M2	Area of buffer in sqft (*software assigned*)
PERIM_M	Perimeter of buffer in feet (*software assigned*)
NEARDIST	Distance to nearest neighbor (meters)
NEAR_FGID	ID of nearest neighbor
SHAPEINDEX	Shape index (1 = square)
A_RICH_BUF	Species richness of rare animals within their dispersal distances (2009)
A_RICH_POL	Species richness of rare animals within polygon (2009)
P_RICH_POL	Species richness of rare plants in polygon (2009)
C_RICH_POL	Richness of rare and exemplary natural communities in polygon (2009)
LGMARSHHA	Area of largest marsh in the complex (hectares)
ROADDENS	Road density within 250m of the complex
DISTROAD	Distance to nearest road (meters)
IFESMEAN	Mean Integrated Fragmentation Effects score (Zankel 2005)
ECOREGION	Ecoregional subsection
WSGROUP	Watershed Group (single character ID; TNC classification)
WSGNAME	Watershed Group name (TNC classification)
BIO	Raw biological score (high score = high quality)
LAND	Raw landscape score (high score = high quality)
HUMAN	Raw human impact score (high score = low impact)
COND	Raw habitat condition score (high score = good condition)
CONDITION	WAP Priority based on statewide and regional condition score
PRIORITY	WAP priority based on COND score and EO add-ins
CONS_AC	Percent of 250m buffer that is in conservation
CONS_PCT	Percent of 250m buffer that is in conservation

NOTES:

BIO Condition score = ($A\_RICH\_BUF_R$*.25) + ($A\_RICH\_POL_R$*.25) + ($P\_RICH\_POL_R$*.25) + ($C\_RICH\_POL_R$*.25)
where all biological variables are positive indicators of biological quality and subscript denotes percentile rank, thus “good” sites score high (maximum percentile rank=100) and “poor” sites score low (minimum percentile rank=0).

LAND Condition score = ($LGMARSHHA_R$*.34) + (VEG_RICH_R*.33) + (NUM_MARSH_R*.33)
where all landscape variables are positive indicators of landscape integrity and subscript R denotes percentile rank, thus “good” sites score high (maximum percentile rank=100) and “poor” sites score low (minimum percentile rank=0).

HUMAN Condition score = ($IFESMEAN_R$*.34) + ($ROADDENS_R$*.33) + ($DISTROAD_R$*.33)
where deleterious human impact variables have been transformed so that all variables are positive indicators of ecological integrity and subscript R denotes percentile rank, thus “good” sites score high (maximum percentile rank=100) and “poor” sites score low (minimum percentile rank=0).

COND The condition index = (BIO+LAND+HUMAN)/3 as defined above

The list above represents the complete set of attributes developed for the WAP habitat data layer. Only select attributes are distributed in the public release version WAP data layers. For more information, please contact the NH Fish and Game Department, Wildlife Division, 11 Hazen Dr, Concord NH 03301
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The fields: A_RICH_BUF, A_RICH_POL, P_RICH_POL and C_RICH_POL, provide species richness counts (number of different species potentially present in the habitat polygon) from the NH Natural Heritage Bureau as of December 2008. Care must be taken in interpreting these counts as most areas of NH have never been surveyed for biodiversity elements. See *Important Background Information for Interpreting Species Richness Counts based on NH Natural Heritage Bureau Data* for details.

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