Although these are seral forests, eventually replaced by Engelmann spruce and subalpine fir forests, they are long-lived seral stages due to slow tree growth in this very cold, very dry climate. Spruce and subalpine fir regeneration is common in the understory. The undergrowth vegetation is typically dominated by dwarf shrubs, low- to medium-height forbs, mosses, and lichens. Common shrub or semi-shrub species are black crowberry, grouseberry, and mountain-heather. In contrast to other ESSF units in the Region except the ESSFxc, white-flowered rhododendron occurs primarily on north-facing slopes and is seldom abundant.

ESSFxv1 Variant The ESSFxv1 is the most extensive of the two ESSFxv variants, extending from the east side of Taseko Lakes west to Tweedsmuir Park on the Pacific Ranges. It also includes the ESSF in the Itcha and Ilgachuz mountains. Precipitation amounts are estimated to be somewhat greater than in the ESSFxv2 and are probably highest in western parts of the variant. The terrain is more rugged, the summits higher, and slopes generally steeper than in the ESSFxv2. The vegetation on zonal sites has more abundant subalpine fir in both the canopy and regeneration layers. The herbaceous layer also has more abundant grouseberry.

ESSFxv2 Variant The ESSFxv2 extends from the east slopes of Anvil Mountain eastward to the east slopes of the Camelsfoot Range, overlooking the Fraser River valley. It includes the highest forested elevations of the Chilcotin and Camelsfoot ranges. Precipitation is probably less in general than in the ESSFxv1. The terrain is largely rounded summits with many slopes of gentle to moderate gradients. Mature forests are dominated by lodgepole pine with relatively little tree regeneration. Subalpine fir is much less abundant than in the ESSFxv1, and stands are more often single-layered.

ESSFxc Subzone The ESSFxc occurs primarily in the Kamloops Forest Region (Lloyd *et al*. 1990) and has a very small area (115 km^2) within the Cariboo Forest Region on the Marble Range, west of Clinton. Here and in the Kamloops Forest Region it occurs above the MSxk Subzone. Vegetation similarities to the ESSFxv include the presence of grouseberry and kinnikinnick and the relatively sparse occurrence of white-flowered rhododendron.

Compared to the ESSFxv, however, the forests are dominated primarily by Engelmann spruce and subalpine fir, feathermosses are more prevalent, ground lichens are less abundant, and pinegrass is present on south-facing slopes. Douglas-fir is also present within the ESSFxc on the Marble Range.

ESSFdc2 Variant The ESSFdc2 occurs primarily on the Thompson Plateau in the Kamloops Forest Region (Lloyd *et al*. 1990) but has a small extent along the southeast border of the Cariboo Forest Region in the Bowers Lake to Bonaparte Lake area. Here, it occurs on relatively low, rounded summits above the SBSmc and SBSmm, at elevations of 1400–1900 m.

The ESSFdc2 has a climate drier than that of the ESSFwk1 and ESSFwc3 but wetter than that of the ESSFxc or ESSFxv. Mean annual temperatures are similar to the ESSFwk1.

Vegetation of the ESSFdc2 is distinguished from other ESSF units of the Region by the presence of grouseberry and abundant white-flowered rhododendron and by the absence of black crowberry. Seral stands of lodgepole pine cover the ESSFdc2 landscape in the Cariboo Forest Region. Subalpine fir and Engelmann spruce are common in the understory. The shrubby undergrowth includes white-flowered rhododendron, black huckleberry, and grouseberry.

ESSFmv1 Variant The ESSFmv1 occurs primarily in the Prince George Forest Region and has only a very small extent (12 km^2) within the Cariboo Forest Region. It is present on the relatively low, rounded summits in the Blackwater–Nazko area west of Pantage Lake at elevations above 1400 m. The climate is drier than that of the ESSFwk and ESSFwc but wetter than all other ESSF climates in the Region. Refer to DeLong *et al.*(1993) for a description of this variant.

ESSFwk1 Variant The ESSFwk1 includes the largest portion of the ESSF Zone (3610 km^2) within the Quesnel Highland. It occurs between 1200 and 1500 m elevation from the northern limits of the Quesnel Highland in the Prince George Forest Region south to about Canim and Mahood lakes. South of the Cariboo River, it occurs above the ICHwk, while to the north it occurs above the SBSwk. Throughout its range, it occurs below the ESSFwc3. Topography of the ESSFwk1 ranges from

ESSFxc
ENGELMANN SPRUCE–SUBALPINE FIR VERY DRY COLD SUBZONE

The ESSFxc has a very small area (115 km^2) in the Cariboo Forest Region, occurring on upper slopes and summits of the Marble Range. Elevations are generally 1550–2000 m. The ESSFxc is more extensive in the Kamloops Forest Region on the Graystokes Plateau, Okanagan Ranges, and some high elevations northwest of Kamloops. It also occurs in the Camelsfoot, Chilcotin, and Lillooet ranges.

Distinguishing Adjacent Units from the ESSFxc (Cariboo Forest Region only)

The **MSxk** occurs below the ESSFxc, and the **AT,** including parkland, occurs above the ESSFxc.

In the **MSxk**, zonal sites have:
- pinegrass;
- little or no Sitka valerian, mountain arnica, or five-leaved bramble;
- little or no white-flowered rhododendron.

In the **AT** (and parkland), zonal sites have:
- predominantly non-forest (meadow, shrubland, etc.) vegetation;
- trees rarely more than 8 m tall.

Site Units of the ESSFxc

A site classification for the Kamloops Forest Region portion of the ESSFxc is presented by Lloyd *et al.* (1990). Preliminary surveys indicate that this classification generally applies to the ESSFxc in the Cariboo Forest Region as well. It should also be noted that, due to calcareous soil parent materials, vegetation of the Marble Range in the Cariboo and Kamloops forest regions differs somewhat from vegetation in the remainder of the ESSFxc.

Distribution of ESSFxc Subzone in the Cariboo Forest Region

TABLE A1.1. Site units (shaded) in the Cariboo Forest Region and their precorrelation equivalents (unshaded).

Current (correlated) BEC unit code												
BEC Unit		Site unit										
		/01	/02	/03	/04	/05	/06	/07	/08	/09	/10	/11
		Equivalent precorrelation code										
	BEC Unit	Ecosystem unit										
AT	AT	(site units not yet described)										
BGxh3	PPBGg	(see Iverson and Coupé 1996a)										
BGxw2	PPBGe	(see Iverson and Coupé 1996b)										
CWHds1	CWHc	see Guide for Vancouver Region (Green and Klinka 1994)										
ESSFdc2	ESSFe1	see Guide for Kamloops Forest Region (Lloyd et al. 1990)										
ESSFwc3	ESSFh2	/01	/02	/03								
ESSFwk1	ESSFh1	/01	/02	/03	/05	/04	/07 in part	/07 in part				
ESSFxc	ESSFd	see Guide for Kamloops Forest Region (Lloyd et al. 1990)										
ESSFxv1	ESSFg, ESSF undif	npe	npe	npe	npe	npe	npe	npe	npe			
ESSFxv2	ESSFg, ESSF undif	npe	npe	npe	npe	npe	npe	npe	npe			
ICHdk	ICHe3	/01	/02	/03	/04	/05	/06	/07	/08	/09		
ICHmk3	ICHe2	/01,/04	/02	/03	/05	/06	/07	/08				
ICHmw3	ICHm1	see Guide for Kamloops Forest Region (Lloyd et al. 1990)										
ICHwk2	ICHh1	/01,/05	/02	/03	/04	/06 in part	/06 in part	/07	/08			
ICHwk4	ICHh2	/01,/06	/02	/03	/04	/05	/07	/08	/09			
IDFdk3	IDFb2	/01	/03	/02	/05	/04	/06	/07	/08	/09, /10		
IDFdk4	IDFb5	/01	/02	/03	/04	/05	/06	/07	/08	/09	/10	
IDFdw	IDFundiff.	npe	npe	npe	npe	npe	npe	npe	npe			
IDFmw2	IDFj1	see Guide for Kamloops Forest Region (Lloyd et al. 1990)										
IDFxm	IDFa4	/01	/02	/03	/04	/05	/06	/07	/08	/09		
IDFxw	IDFa2	/01,/05,/07	/02	/03	/04	/06	/08	/09				

[a]No previous equivalent (npe)

TABLE 5.2.1 *Distribution of Fen Site Associations by biogeoclimatic zone*

		BG PP	BWBS SWB	ESSF	ICH	IDF	MS	SBPS SBS	CDF	CWH	MH
Wf01	Water sedge – Beaked sedge		xx	x	xx	xxx	xxx	xxx		x[i]	
Wf02	Scrub birch – Water sedge		xxx	x	xx	xx	xx	xx			
Wf03	Water sedge – Peat-moss			xx				x			
Wf04	Barclay's willow – Water sedge – Glow mosss		x	xxx			x	x			
Wf05	Slender sedge – Common hook-moss		x		xx	xx	xx	xx			
Wf06	Slender sedge – Buckbean		x		x	x		x			
Wf07	Scrub birch – Buckbean – Shore sedge		x		x	x		x			
Wf08	Shore sedge – Buckbean – Hook-moss		x	x		x	x	x			
Wf09	Few-flowered spike-rush – Hook-moss			x			x	x			
Wf10	Hudson Bay clubrush – Red hook-moss							x			
Wf11	Tufted clubrush – Star moss		x	x	x		x	x			
Wf12	Narrow-leaved cotton-grass – Marsh-marigold			xxx							
Wf13	Narrow-leaved cotton-grass – Shore sedge			xx			x				
Wf50	Narrow-leaved cotton-grass – Peat-moss									x	xxx
Wf51	Sitka sedge – Peat-moss				x				xx	xx	
Wf52	Sweet gale – Sitka sedge								xx	xx[s]	
Wf53	Slender sedge – White beak-rush								x	xx[s]	

x = incidental; < 5% of wetlands xx = minor; 5–25% of wetlands xxx = major; >25% of wetlands
i = inland areas only s = southern subzones only

TABLE 5.2.2 *Fen Species Importance Table*

	Species	Wf01	Wf02	Wf03	Wf04	Wf05	Wf06	Wf07	Wf08
Shrubs	*Betula nana*								
	Salix barclayi								
	Salix pedicellaris								
	Spiraea douglasii								
	Myrica gale								
Herbs and Dwarf Shrubs	*Carex utriculata*								
	Carex aquatilis								
	Comarum palustre								
	Calamagrostis canadensis								
	Carex lasiocarpa								
	Menyanthes trifoliata								
	Carex limosa								
	Carex chordorrhiza								
	Eleocharis quinqueflora								
	Trichophorum alpinum								
	Trichophorum cespitosum								
	Eriophorum angustifolium								
	Caltha leptosepala								
	Carex anthoxanthea								
	Equisetum fluviatile								
	Carex magellanica								
	Carex sitchensis								
	Rhynchospora alba								
	Carex livida								
	Eriophorum chamissonis								
	Vahlodea atropurpurea								
	Drosera anglica								
	Hypericum anagalloides								
	Triantha glutinosa								
	Schoenoplectus tabernaemontani								
	Fauria crista-galli								
	Senecio triangularis								
	Andromeda polifolia								
	Kalmia microphylla								
	Oxycoccus oxycoccos								
	Triglochin maritima								
	Drosera rotundifolia								
	Leptarrhena pyrolifolia								
	Platanthera dilatata								
	Sanguisorba canadensis								
	Utricularia intermedia								
	Viola palustris								
Lichens and Mosses	*Sphagnum* Group I								
	Aulacomnium palustre								
	Drepanocladus spp.								
	Sphagnum Group II								
	Tomentypnum nitens								
	Philonotis fontana								
	Calliergon stramineum								
	Scorpidium spp.								
	Campylium stellatum								
	Warnstorfia spp.								
	Meesia triquetra								

Carex aquatilis – Carex utriculata

General Description

The Water sedge – Beaked sedge Fen Site Association is the most common and widespread Fen Site Association in the province. It occurs in all but the warmest and driest subzones from low to subalpine elevations on sites that are annually inundated by shallow, low-energy flood waters and that experience some late-season drawdown. **Wf01** fens are found in a wide variety of landscape positions but most commonly palustrine basins.They occupy wetter zones in larger peatland complexes but also form extensive pure "meadows."

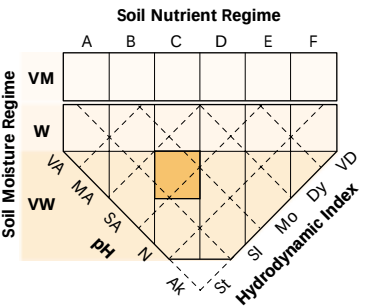
Species diversity is low; *Carex aquatilis* and *Carex utriculata* cover is often continuous, with scattered forbs, aquatics, and mosses in the understorey. On sites that dry out at the surface, *Calamagrostis canadensis* or *C. stricta* can become prominent, species diversity increases, and sites become more meadow-like.

Peat depths range from 30 to > 300 cm. Common soil types include typic and terric Fibrisols and Mesisols. This Site Association tolerates variable hydrology.

Characteristic Vegetation

Tree layer (0 - **0** - 0)
Shrub layer (0 - **0** - 10)
Herb layer (13 - **80** - 100)
Carex aquatilis*, *C. utriculata
Moss layer (0 - **5** - 100)
Drepanocladus aduncus

Wetland Edatopic Grid



Comments

Sites dominated by C. utriculata *and* C. aquatilis *but with mineral or humic soils are described by the* ***Wm01****. Because* ***Wf01*** *and* ***Wm01*** *sites are species-poor and the two dominant sedge species have a wide ecological amplitude, the plant community poorly differentiates between sites on peat (****Wf01****) and those on mineral soil (****Wm01****).* ***Wf01*** *sites typically have less* C. utriculata *and fewer aquatics than* ***Wm01*** *sites. The* ***Wf01*** *develops from the* ***Wm01*** *in most circumstances.*

Sites that are drier or at least have more pronounced microtopography than the ***Wf01*** *are usually occupied by communities with low shrubs and high moss cover (most commonly, the* ***Wf02****). However, at higher elevations few shrubs occur and only moss cover increases (****Wf03****). Sites with greater waterflow are characterized by tall-shrub swamps dominated by willows or alders, and water sedges, and have mineral or humic peat soils.*

TABLE 5.8.1 *Distribution of "Transition" Site Associations by biogeoclimatic zone*

		BG PP	BWBS SWB	ESSF	ICH	IDF	MS	SBPS SBS	CDF	CWH	MH
Gs01	Alkali saltgrass	xx				xx^{d}					
Gs02	Nuttall's alkaligrass – Foxtail barley					xx^{d}	x^{d}	x^{v}			
Gs03	Field sedge	xx				xx^{d}		xx^{v}			
Gs04	Tufted hairgrass					x^{d}	xx^{d}	xx^{v}			
Sc01	Scrub birch – Kinnikinnick		xx			x^{dc}	xx^{dc}	xx^{v}			
Sc02	Grey-leaved willow – Glow moss		xx	x^{dc}		x^{dc}	xx^{dc}				
Sc03	Barclay's willow – Arrow-leaved groundsel		x	xxx							

x = incidental; < 5% of wetlands xx = minor; 5–25% of wetlands xxx = major; >25% of wetlands
d = dry subzones only v = dry subzones of the SBPS only dc = dry and cold subzones only

TABLE 5.8.2 *"Transition" Species Importance Table*

	Species	Gs01	Gs02	Gs03	Gs04
Shrubs	*Salix brachycarpa*				
	Betula nana				
	Salix glauca				
	Salix barclayi				
Herbs	*Distichlis spicata* var. *stricta*				
	Spartina gracilis				
	Suaeda calceoliformis				
	Aster ericoides ssp. *pansus*				
	Poa secunda				
	Hordeum jubatum				
	Puccinellia nuttalliana				
	Carex praegracilis				
	Elymus trachycaulus				
	Poa pratensis				
	Aster ericoides				
	Potentilla anserina				
	Juncus balticus				
	Deschampsia cespitosa				
	Potentilla gracilis				
	Taraxacum officinale				
	Carex utriculata				
	Achillea millefolium				
	Muhlenbergia richardsonis				
	Kobresia myosuroides				
	Koeleria macrantha				
	Arctostaphylos uva-ursi				
	Antennaria pulcherrima				
	Maianthemum stellatum				
	Aster ciliolatus				
	Calamagrostis canadensis				
	Thalictrum occidentale				
	Fragaria virginiana				
	Senecio triangularis				
	Valeriana sitchensis				
	Epilobium angustifolium				
	Erigeron peregrinus				
	Sanguisorba canadensis				
	Trollius albiflorus				
	Equistem arvense				
Mosses	*Bryum pseudotriquetrum*				
	Drepanocladus spp.				
	Aulacomnium palustre				
	Brachythecium spp.				
	Mnium spp.				

Sc01	Sc02	Sc03	Common Name
▮▮▮	▮		short-fruited willow
▮▮▮▮▮	▮▮▮▮		scrub birch
▮▮	▮▮▮▮▮		grey-leaved willow
▮	▮	▮▮▮▮▮	Barclay's willow
			alkali saltgrass
			alkali cordgrass
			seablite
▮			tufted white prairie aster
▮			Sandberg's bluegrass
▮			foxtail barley
			Nuttall's alkaligrass
▮▮	▮	▮	field sedge
▮	▮		slender wheatgrass
▮	▮		Kentucky bluegrass
▮			tufted white prairie aster
▮			common silverweed
▮▮▮	▮		Baltic rush
▮	▮		tufted hairgrass
▮	▮		graceful cinquefoil
▮	▮		common dandelion
	▮	▮	beaked sedge
▮▮	▮		yarrow
▮▮▮▮			mat muhly
▮			Bellard's kobresia
▮			junegrass
▮▮▮▮	▮▮		kinnikinnick
▮▮	▮		showy pussytoes
▮	▮		star-flowered false Solomon's-seal
▮	▮▮		Lindley's aster
▮	▮▮	▮▮	bluejoint
▮	▮▮	▮	western meadowrue
▮▮	▮▮▮	▮	wild strawberry
	▮	▮▮▮	arrow-leaved groundsel
		▮▮▮	Sitka valerian
▮	▮▮	▮	fireweed
	▮	▮	subalpine daisy
		▮	Sitka burnet
	▮	▮	globeflower
		▮▮	common horsetail
▮	▮▮	▮	
▮	▮		hook-mosses
▮	▮▮▮▮	▮▮▮	glow moss
▮		▮▮	feather-moss
		▮▮	leafy mosses

Betula nana – Arctostaphylos uva-ursi

General Description

The Scrub birch – Kinnikinnick Shrub-carr Site Association is common in the colder, drier subzones of the Central Interior. These shrub-carrs form small communities in frost-prone basins with moist, cold substrates and often surround larger wetlands. In drier climates, these sites are rarely, if ever, inundated, but subsurface saturation is typical in the early season. Sites are distinctly mounded with shrubs on relatively dry organic-rich mounds.

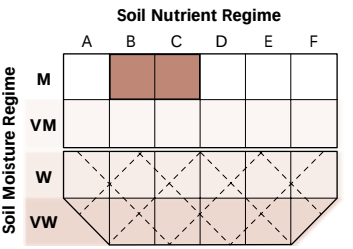
The **Sc01** has very high species diversity. *Betula nana* dominates the shrub layer with high cover of *Salix brachycarpa* and *S. glauca*. *Arctostaphylos uva-ursi* and *Muhlenbergia richardsonis* are common dominants of the very diverse herb layer. The moss layer is poorly developed and variable.

Soils are often fine textured, poorly to imperfectly drained materials with thin surface organic accumulation. Gleysols and gleyed Brunisols are common soil types.

Characteristic Vegetation

Tree layer (0 - **0** - 0)
Shrub layer (10 - **58** - 80)
Betula nana, ***Salix brachycarpa***, *S. glauca*
Herb layer (40 - **80** - 99)
Achillea millefolium, Antennaria pulcherrima, ***Arctostaphylos uva-ursi***, *Carex praegracilis, Fragaria virginiana,* ***Juncus balticus***, ***Muhlenbergia richardsonis***
Moss layer (0 - **15** - 40)

Wetland Edatopic Grid



Comments

Sc01 *occurs alone in shallow depressions or around the periphery of* ***Wf01***, ***Wm01***, *or* ***Gs03*** *ecosystems. Though the* ***Sc01*** *and* ***Sc02*** *occupy similar frost-prone sites, the* ***Sc01*** *occurs on drier site conditions.*

Betula nana*–dominated ecosystems are widespread in the Boreal, especially at higher elevations in the SWB. However, few plots in these communities have been established; it is possible that the* ***Sc01*** *also occurs in the Northern Boreal Mountains. Other scrub birch–dominated Shrub-carr Site Associations certainly occur but remain undescribed.*

The ***Sc01*** *is described by Steen and Roberts (1988).*

TABLE 5.3.1 *Distribution of Marsh Site Associations by biogeoclimatic zone*

	BG PP	BWBS SWB	ESSF	ICH	IDF	MS	SBPS SBS	CDF	CWH	MH
Wm01 Beaked sedge – Water sedge	x	xx	x	xxx	xxx	xx	xx		x	
Wm02 Swamp horsetail – Beaked sedge		x		x	x	x	xx			
Wm03 Awned sedge	x				x					
Wm04 Common spike-rush	x	x		xx	x	x	xx		x	
Wm05 Cattail	xxx	x		xx	xx	x	xx	xx	x[s]	
Wm06 Great bulrush	xxx	x		x	xx	xx	x	x	x	
Wm07 Baltic rush	x				xx					
Wm50 Sitka sedge – Hemlock-parsley								xx	xx	
Wm51 Three-way sedge				x				x	x	

x = incidental; < 5% of wetlands xx = minor; 5–25% of wetlands xxx = major; >25% of wetlands
s = southern subzones only

TABLE 5.3.2 *Marsh Species Importance Table*

	Species	Wm01	Wm02	Wm03	Wm04	Wm05
Herbs and Dwarf Shrubs	*Carex utriculata*	▮▮▮▮	▮▮▮▮	▮		▮▮
	Carex aquatilis	▮▮▮	▮▮	▮		
	Equisetum fluviatile	▮	▮▮▮▮▮		▮	
	Comarum palustre	▮▮	▮▮			▮
	Sium suave	▮	▮▮			
	Carex exsiccata			▮		
	Carex atherodes			▮▮▮▮▮		
	Polygonum amphibium	▮	▮	▮▮	▮	▮
	Eleocharis palustris		▮		▮▮▮▮▮	▮
	Potamogeton richardsonii				▮▮▮	
	Typha latifolia		▮			▮▮▮▮▮
	Schoenoplectus acutus					▮
	Menyanthes trifoliata					
	Utricularia macrorhiza	▮	▮	▮	▮	▮
	Juncus balticus	▮		▮		
	Hordeum jubatum				▮	
	Potentilla anserina			▮		
	Calamagrostis canadensis	▮▮	▮	▮▮	▮	
	Cicuta douglasii		▮			▮
	Lysichiton americanus					▮
	Oenanthe sarmentosa					▮
	Galium trifidum	▮				
	Spiraea douglasii					▮
	Carex sitchensis					
	Nuphar lutea ssp. *polysepala*				▮	▮
	Dulichium arundinaceum					
Mosses	*Drepanocladus* spp.	▮▮	▮▮	▮▮	▮	▮
	Warnstorfia spp.	▮	▮	▮	▮	▮

Carex utriculata – Carex aquatilis

General Description

Beaked sedge – Water sedge marshes constitute the most common and widespread Marsh Site Association in the province. The **Wm01** occurs in all subzones from low to sub-alpine elevations on sites that are inundated by shallow, low-energy floodwaters and that experience some late-season drawdown. These marshes are found in a wide variety of landscape positions including flooded beaver ponds, lake margins, floodplains, and palustrine basins.

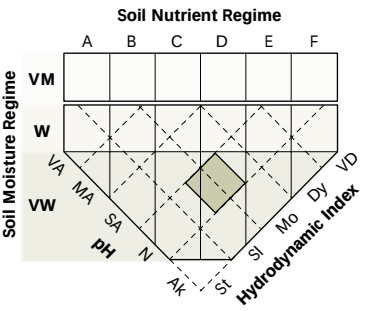
Species diversity is low and plant cover is strongly dominated by *Carex utriculata* and *C. aquatilis* with scattered forbs, aquatics, and mosses. On sites experiencing significant surface drying, species diversity increases and sites become more meadow-like. Species such as *Calamagrostis canadensis*, *Geum macrophyllum*, or *Deschampsia cespitosa* can become prominent.

The **Wm01** occurs over a wide range of site conditions on mineral substrates with thin peat veneers. Common soil types include Gleysols and Terric Humisols.

Characteristic Vegetation

Tree layer (0 - **0** - 0)
Shrub layer (0 - **0** - 5)
Herb layer (13 - **80** - 100)
Carex aquatilis*, *C. utriculata
Moss layer (0 - **5** - 100)

Wetland Edatopic Grid



Comments

*The **Wf01** and **Wm01** have similar plant communities, but, because these units are species-poor and the two dominant sedge species have a wide ecological amplitude, the plant community poorly differentiates between sites on peat (**Wf01**) and those on mineral soil (**Wm01**). In general, the **Wm01** is more deeply flooded, has more dynamic hydrology, and has a higher cover of* C. utriculata.

*The **Wm02** is another similar community that occurs on more hydrologically dynamic locations such as lake margins or floodplains. In cooler climates the **Wm01** frequently develops into **Wf01** on sites with less dynamic hydrology.*

*Some **Wm01** sites have scattered tall shrubs; those sites supporting > 10% shrub cover are described by Swamp Site Associations (Section 5.4).*