



Blo' Norton and Betty's Fen
Establishment of Monitoring Plots
2020

Mike Harding on behalf of the Little Ouse Headwaters Project



Little Ouse
Headwaters
Project

Conservation & Community

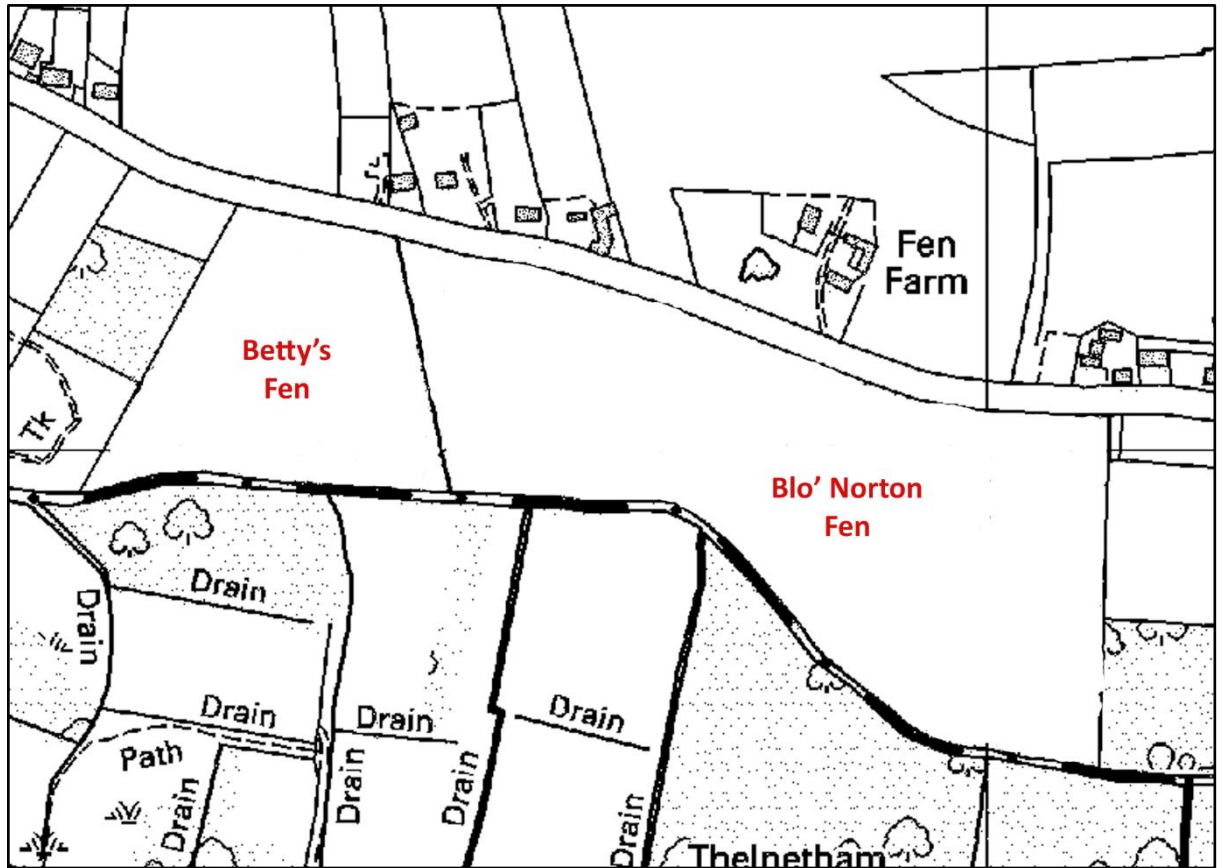
CONTENTS

1. AIMS	3
2. METHODS	4
2.1 The Monitoring Methods	4
2.2 Locating Monitoring Plots	4
3. RESULTS	7
3.1 BNF01 M22a Fen Meadow, West Side of Betty's Fen	7
3.2 BNF02 M22a Fen Meadow, East Side of Betty's Fen	12
3.3 BNF03 S25c <i>Cladium Fen</i> , West Side of Blo' Norton Fen	17
3.4 BNF04 M22c <i>Schoenus nigricans-Juncus subnodulosus mire, Caltha palustris-Galium uliginosum</i> sub-community East Side of Blo' Norton Fen	21
4. REFERENCES	27
Figure 1: Location of Blo'Norton and Betty's Fens	3
Figure 2: The Layout of a 10 x 10m Monitoring Plot	4
Figure 3: Location of Monitoring Plots at Blo' Norton and Betty's Fens	6
Table 1: The Four Phases of Monitoring (OHES 2010)	4
Table 2: Monitoring Plot Locations at Blo' Norton and Betty's Fens	5

1. AIMS

The Little Ouse Headwaters project manage Blo' Norton and Betty's Fen SSSI as a nature reserve. The areas are shown on Figure 1.

Figure 1 : Location of Blo' Norton and Betty's Fens



Prior to this project there was no formal monitoring on the sites. The aim of this work is therefore:

- To install two monitoring plots on Blo' Norton Fen and two on Betty's Fen, adopting the methodology laid out by OHES (2010).

2. METHODS

2.1 The Monitoring Methods

Two monitoring plots were installed on Blo' Norton Fens and two on Betty's Fens. The recommended monitoring methodology described in OHES was followed. OHES (2010) gives the four phases of monitoring common to all of the LOHP site monitoring projects, summarised in Table 1. All phases were undertaken for this project. OHES (2010) details the monitoring protocols. They were adhered to in all aspects, other than plot marking.

Table 1: The Four Phases of Monitoring (OHES 2010)

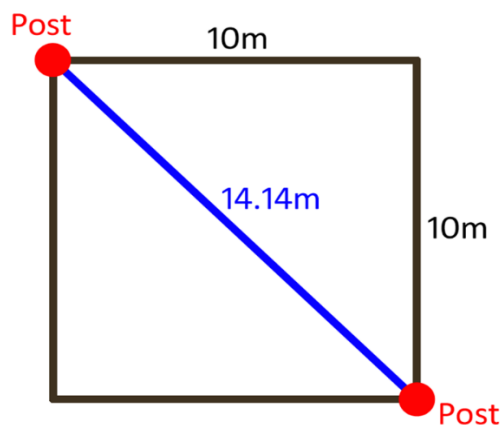
Survey intensity	Fieldwork Element		Function within the Survey
Rapid	1	Locating Monitoring Plots	To establish locations for the Monitoring Plots
	2	Photographic Record	To produce a record surveillance images showing the condition of the developing vegetation
Full	3	Vegetation structural characters	To record features of the vegetation structure against which management requirements can be established.
	4	Floristic sub-sampling	To record the floristic composition of the plot in order to judge to success of the restoration measures against target floristic conditions.

2.2 Locating Monitoring Plots

The protocol suggests positioning marker posts at distance, and then stringing long tapes of 50m between them, and measuring off from this line. However, experience with re-locating and recording plots established on other sites suggested this line was difficult to keep straight, especially in any wind, and hence there was the likelihood of mis-registering the plots at successive recordings. There seemed to be no benefit to installing the marker posts remotely as each plot required two posts.

Hence on these sites, the two corner points on one diagonal were marked directly with a white-topped post, shown in Figure 2.

Figure 2: The Layout of a 10 x 10m Monitoring Plot



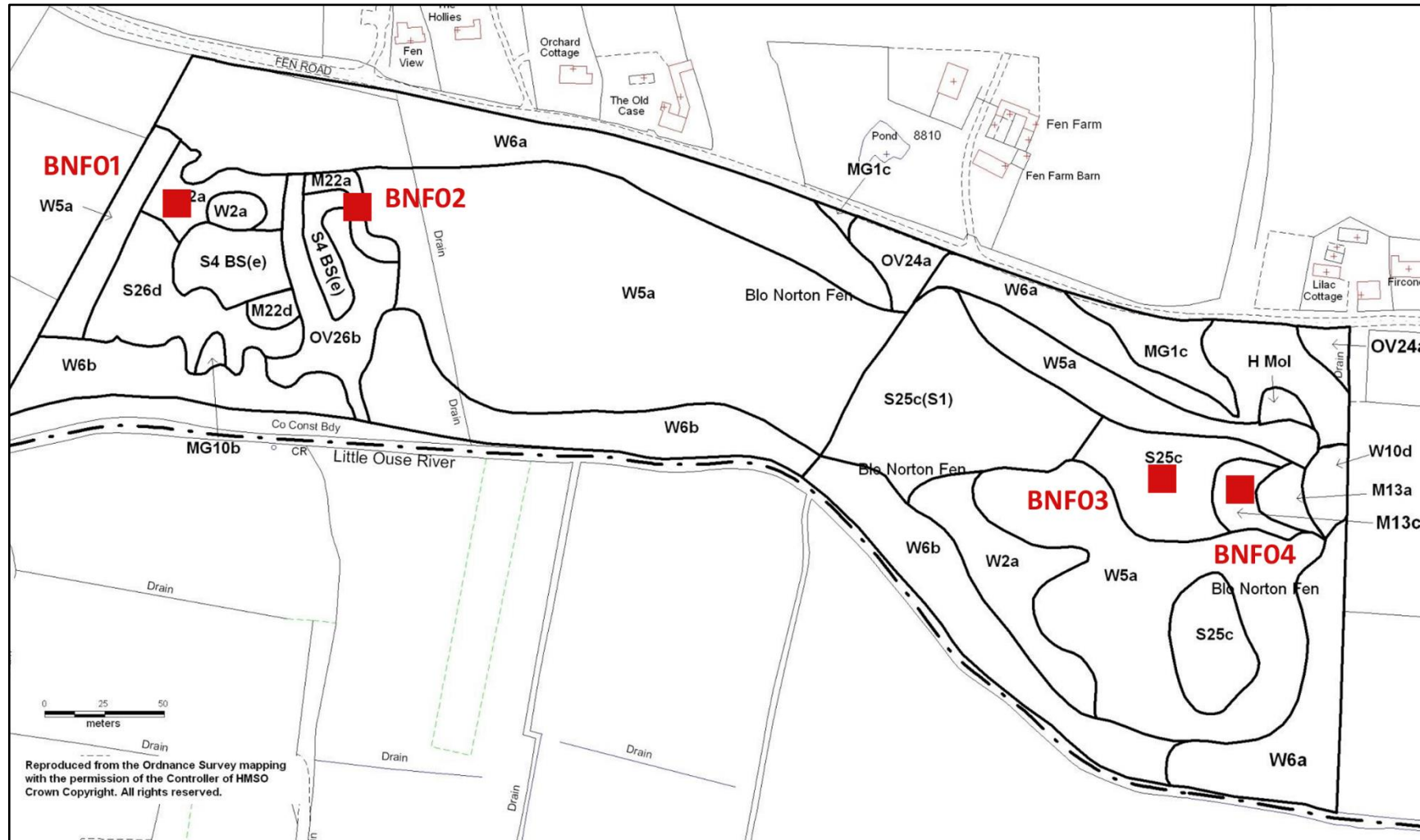
Marking the diagonal points of a 10m square makes re-establishing the original 10x10m square unequivocal, since the remaining 2 corners, if measured as 10m from both diagonal posts, can only be located at one point. The length of the diagonal is 14.14m. The posts were located in the south-east and north-west corners. The plot layout is shown on Figure 2, the approximate location of the plots shown on Figure 3. The location of each post is recorded with a 10-digit GPS reading. All GPS readings in this report refer to OS Square TM.

The details of the monitoring plots and locations are given in Table 2.

Table 2: Monitoring Plot Locations at Betty's and Blo' Norton Fens. Vegetation type taken from NVC map in OHES (2012)

VEGETATION TYPE	PLOT CODE	MARKER POSTS	Marker Post Location	EASTING	NORTHING	Plot location
M22a <i>Juncus subnodulosus-Cirsium palustre</i> fen meadow, Typical sub-community	BNF01 Betty's Fen	BNF01-01	South-east corner of 10m plot	01575	79071	Plot between tree margin and pond. BNF01-01 c.3m from edge of tall reed. BNF01-02 c.2m from edge of scrub.
		BNF01-02	North-west corner of 10m plot.	01568	79083	
M22 <i>Juncus subnodulosus-Cirsium palustre</i> fen meadow, Typical sub-community	BNF02 Betty's Fen	BNF02-01	South-east corner of 10m plot	01652	79048	Fen area south of woodland, north of scrub/reed.
		BNF02-02	North-west corner of 10m plot.	01654	79063	
S25c <i>Phragmites australis-Eupatorium cannabinum fen, Cladium mariscus</i> sub-community	BNF03 Blo' Norton Fen	BNF03-01	South-east corner of 10m plot	01959	78989	Plot between woodland to north and south.
		BNF03-02	North-west corner of 10m plot.	01953	78999	
M22c <i>Schoenus nigricans-Juncus subnodulosus mire, Caltha palustris-Galium uliginosum</i> sub-community.	BNF04 Blo' Norton Fen	BNF04-01	South-east corner of 10m plot	02003	78967	North of dipwells, west of barrow way.
		BNF04-02	North-west corner of 10m plot.	01997	78969	

Figure 3: Location of Monitoring Plots at Blo' Norton and Betty's Fens Meadow. Base is the NVC Map from OHES (2012). See Table 2 for precise location details.



3. RESULTS

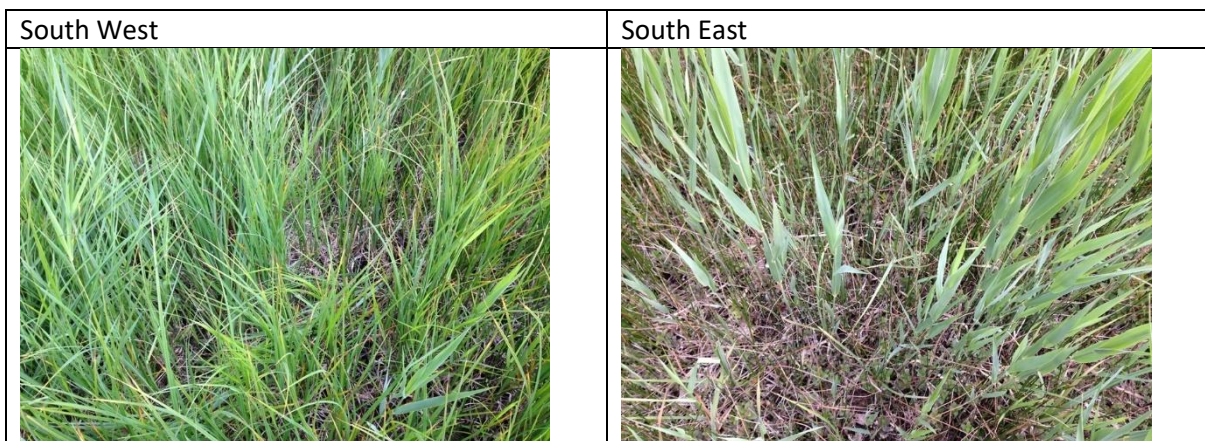
3.1 BNF01 M22a Fen Meadow, West Side of Betty's Fen

3.1.1 Photographic Record

BNF01: M22a Fen Meadow, West Side of Betty's Fen. View taken from TM 01570 79077, looking north.



BNF01: M22a Fen Meadow, West Side of Betty's Fen. Quadrants





3.1.2 Vegetation Structural Characters

Monitoring Plot		BNF01				
Recorder		Mike Harding				
Survey Date		28 May 2020				
Character of the ground surface						
Flat and peaty, not tussocky. Signs of winter inundation to the south of the plot, near to the scrape. Grades northwards towards scrub with increasing elevation, also rising towards the west from the east. Consequent change in vegetation from wet and rush/sedge in south east, to dryer and more grassy meadow towards north and west.						
Soil Wetness						
Dry, dusty		Dry, firm		Slightly damp		Moist
						I
						III
	Attribute	Quadrant				Average
		SW	SE	NW	NE	
Layer height	Standing water (cm)	0	0	0	0	0
	Plant litter (cm)	3	5	3	3	3.5
	Woody seedlings (cm)	0	0	0	0	0
	Large sedges / rushes (cm)	90	70	80	70	77.5
	Reed-like grasses (cm)	100	120	100	110	107.5
	Woody saplings (cm)	0	0	0	0	0
Cover value	Standing water (%)	0	0	0	0	0
	Trampling (%)	0	0	0	0	0
	Dunging (%)	0	0	0	0	0
	Bare ground (%)	15	20	20	20	18.75
	Plant litter (%)	80	70	70	70	52.5
	Bryophytes (%)	0	0	40	30	17.5
	Woody seedlings (%)	0	0	0	0	0
	Large sedges / rushes (%)	80	50	70	50	62.5
	Reed-like grasses (%)	5	25	5	60	23.75
	Woody saplings (%)	0	0	0	0	0

3.1.3 Floristic Sampling

Monitoring Plot	BNF01
Recorder	Mike Harding
Survey Date	28 May 2020

	Sample Number, 1m ²																				Frequency 2020
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<i>Phragmites australis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Carex acutiformis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Juncus subnodulosus</i>	P				P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		80
<i>Mentha aquatica</i>			P	P	P		P	P	P	P	P		P	P	P	P	P	P	P	P	80
<i>Festuca rubra</i>	P	P	P	P	P	P	P	P	P	P	P	P	P								65
<i>Phalaris arundinacea</i>	P	P	P	P		P	P	P	P	P					P	P	P			P	65
<i>Brachytecium rutabulum</i>	P	P	P	P	P	P	P	P		P	P	P	P								60
<i>Cardamine pratensis</i>	P		P	P			P	P			P							P	P	P	45
<i>Cardamine amara</i>	P	P	P		P	P	P				P	P	P								45
<i>Poa trivialis</i>	P	P	P		P	P	P	P				P	P								45
<i>Lythrum salicaria</i>								P	P	P					P	P	P	P	P	P	45
<i>Glechoma hederacea</i>	P	P		P			P			P	P	P	P								40
<i>Kindbergia praelonga</i>	P			P	P	P					P	P	P							P	40
<i>Ranunculus repens</i>	P											P	P	P			P		P	P	35
<i>Lycopus europaeus</i>							P				P				P		P	P	P	P	35
<i>Agrostis stolonifera</i>		P		P				P							P	P				P	30
<i>Galium palustre</i>				P				P			P							P		P	30
<i>Epilobium parviflorum</i>			P	P	P	P								P							25
<i>Holcus lanatus</i>	P										P	P	P								20
<i>Cerastium fontanum</i>	P										P	P		P							20
<i>Samolus valerandi</i>								P						P			P	P			20
<i>Filipendula ulmaria</i>	P	P		P																	15

<i>Berula erecta</i>			P	P																P	15	
<i>Calliergonella cuspidata</i>				P				P		P												15
<i>Galium aparine</i>					P		P					P										15
<i>Solanum dulcamara</i>						P	P	P														15
<i>Iris pseudacorus</i>									P						P						P	15
<i>Rumex sanguineus</i>	P									P												10
<i>Carex remota</i>	P			P																		10
<i>Eupatorium cannabinum</i>					P		P															10
<i>Urtica dioica</i>					P		P															10
<i>Lotus uliginosus</i>							P	P														10
<i>Ranunculus flammula</i>								P	P													10
<i>Potamogeton polygonifolius</i>															P				P			10
<i>Calamagrostis canescens</i>															P					P		10
<i>Plagiomnium undulatum</i>	P																					5
<i>Myosotis secunda</i>		P																				5
<i>Ficaria verna</i>		P																				5
<i>Cirsium palustre</i>							P															5
<i>Bryum pseudotriquetrum</i>								P														5
<i>Vicia cracca</i>										P												5
<i>Geranium robertianum</i>											P											5
<i>Plagiomnium elatum</i>											P											5
<i>Cirsium arvense</i>												P										5
<i>Carex disticha</i>																					P	5
																						Mean
Total Number Species	18	12	11	16	13	11	18	18	9	18	15	12	14	8	9	9	10	9	7	12		12.45

3.1.4 Commentary

Vegetation structure

A relatively sparse tier of reed overtops a denser mid-sward dominated by rushes and pond sedge with some herbaceous dicots. The ground layer is typically a high cover of litter with some significant bryophyte cover in the northern half of the plot. There is no significant woody element. Because the stand was mown in the previous summer the sward is less than a metre tall with main rush/sedge layer 70-80cm. There is no standing water and relatively little bare ground.

Floristics

The plot is dominated by a mix of *Carex acutiformis* and *Juncus subnodulosus* with a relatively sparse upper tier of *Phragmites*, sometimes with *Phalaris arundinacea*. The north and west margins of the plot are more elevated and dryer, with higher frequency of meadow species such as *Festuca rubra*, *Holcus lanatus* and *Poa trivialis*, plus herbs such as *Cardamine pratensis*, *Epilobium*, *Urtica dioica* and so on. The dryland mosses *Brachythecium rutabulum* and *Kindbergia praelonga* are very frequent and account for the high cover of mosses in the northern quadrants. The south and east half of the plot is lower and wetter and more fen-like. Here species such as *Samolus valerandi*, *Galium palustre*, *Potamogeton* and the rarer fen bryophytes *Bryum pseudotriquetrum* and *Plagiomnium elatum* were recorded. The plot retains indicators of disturbance and previous scrub cover, such as *Carex remota*, *Glechoma hederacea* and some dry ground ruderals, but these are of low frequency and will decline further with regular mowing.

The sward is moderately rich with a mean number of species per quadrat of 12.45. A significant proportion of these are non-fen species and although assigning the plot to M22a *Juncus subnodulosus-Cirsium palustre* fen meadow, Typical sub-community is the best NVC fit, it still lacks many of the characteristic species of that community and will take some time to develop the full range of species.

Summary of records and events

The plot was reclaimed from scrub and the scrapes made in winter 2005. The plot has been mown annually in summer since then, with the cuttings removed.

Relation to past and target conditions

The plot appears to be progressing well towards species-rich fen meadow but is still strongly dominated by sedges rushes and reed. Further mowing should show improvements and reduction in undesirable species.

3.2 BNF02 M22a Fen Meadow, East Side of Betty's Fen

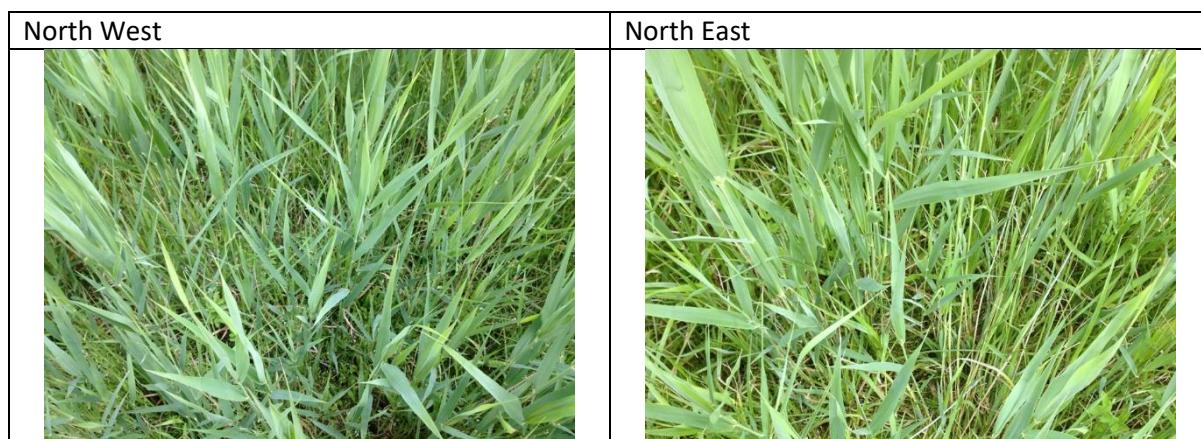
3.2.1 Photographic Record

BNF02: M22a Fen Meadow, East Side of Betty's Fen. View taken from TM 01644 79049, looking north.



BNF02: M22a Fen Meadow Quadrants





3.2.2 Vegetation Structural Characteristics

Monitoring Plot		BNF02: M22a Fen Meadow				
Recorder		Mike Harding				
Survey Date		28 th May 2020				
Character of the ground surface						
Flat peat surface with low hollows. Some old tree stumps – these were avoided during sampling.						
Soil Wetness						
Dry, dusty		Dry, firm		Slightly damp		Moist
						III
						I
	Attribute	Quadrant				Average
		SW	SE	NW	NE	
Layer height	Standing water (cm)	0	0	0	0	0
	Plant litter (cm)	1	1	1	1	1
	Woody seedlings (cm)	0	0	0	0	0
	Large sedges / rushes (cm)	60	35	60	60	53.75
	Reed-like grasses (cm)	120	75	90	110	98.75
	Woody saplings (cm)	0	0	0	0	0
Cover value	Standing water (%)	0	0	0	0	0
	Trampling (%)	0	0	0	0	0
	Dunging (%)	0	0	0	0	0
	Bare ground (%)	5	5	20	20	12.5
	Plant litter (%)	30	40	30	20	30
	Bryophytes (%)	20	40	20	30	27.5
	Woody seedlings (%)	0	0	0	0	0
	Large sedges / rushes (%)	30	30	20	25	26.25
	Reed-like grasses (%)	40	30	70	25	41.25
	Woody saplings (%)	0	0	0	0	0

3.2.3 Floristic Sampling

Monitoring Plot	BNF02
Recorder	Mike Harding
Survey Date	28 th May 2020

	Sample Number																				Frequency 2020
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<i>Phragmites australis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Carex acutiformis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Festuca rubra</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Brachythecium rutabulum</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P			P	P	P		90
<i>Angelica sylvestris</i>	P	P	P	P	P	P	P	P	P	P			P	P		P	P		P	P	85
<i>Silene flos-cuculi</i>	P	P	P	P	P	P	P	P		P			P	P		P	P	P	P	P	80
<i>Agrostis stolonifera</i>	P	P	P	P	P		P	P	P	P	P		P		P		P		P	P	75
<i>Cardamine pratensis</i>	P	P	P	P		P		P	P		P		P		P	P		P	P	P	70
<i>Galium palustre</i>	P	P		P	P			P	P	P			P	P		P	P	P	P		65
<i>Mentha aquatica</i>	P	P	P		P	P	P	P			P		P	P		P			P	P	65
<i>Myosotis secunda</i>	p	P	P	P	P		P	P	P					P	P		P		P	P	65
<i>Juncus subnodulosus</i>	P				P	P	P	P	P				P	P		P	P	P	P		60
<i>Phalaris arundinacea</i>				P		P		P	P	P		P		P	P	P		P	P	P	60
<i>Cirsium palustre</i>		P			P	P				P		P	P			P		P		P	45
<i>Holcus lanatus</i>	P	P				P					P	P		P				P	P		40
<i>Ajuga reptans</i>	P		P				P	P		P			P					P		P	40
<i>Lythrum salicaria</i>	P		P				P		P	P				P					P	P	40
<i>Poa trivialis</i>	P		P			P	P					P	P					P		P	40
<i>Kindbergia praelonga</i>				P						P	P	P		P	P				P		35
<i>Calliergonella cuspidata</i>				P	P	P		P						P		P			P		35
<i>Filipendula ulmaria</i>						P		P			P		P	P		P				P	35

<i>Vicia cracca</i>	P						P							P	P	P					25	
<i>Ranunculus repens</i>						P						P		P				P				20
<i>Galium aparine</i>										P	P	P							P			20
<i>Carex x turfosa</i>					P						P						P					15
<i>Taraxacum officinalis</i>						P					P								P			15
<i>Plagiomnium elatum</i>			P																P			10
<i>Primula veris</i>									P										P			10
<i>Urtica dioica</i>												P							P			10
<i>Iris pseudacorus</i>													P								P	10
<i>Bryum pseudotriquetrum</i>								P														5
<i>Brachythecium rivulare</i>								P														5
<i>Anthriscus sylvestris</i>													P									5
<i>Myosotis arvensis</i>													P									5
																						Mean
Total Number Species	17	13	14	13	14	17	14	18	13	15	13	15	15	19	9	16	12	18	15	16	14.80	

3.2.4 Commentary

Vegetation structure

The community is dominated by a mix of *Phragmites* and *Carex acutiformis* separated into an upper sparser and lower much denser tier of vegetation. With the *C. acutiformis* is a range of fen herbs which includes a scattering of tussocks of *Carex x turfosa* and patchy *Juncus subnodulosus*. The ground layer includes reasonable cover of bryophytes, 20-30%, with similar cover of plant litter and some bare ground but there is no standing water, even in the hollows. Regular mowing has maintained the plots free of scrub.

Floristics

Carex acutiformis dominates the plot with an upper, sparser tier of *Phragmites* and *Phalaris arundinacea*. Fen herbs are more frequent here than in the previous Plot, with *Silene flos-cuculi*, *Mentha aquatica*, *Angelica sylvestris*, *Galium palustre* and *Cardamine pratensis* all frequent. Grasses typical of M22 are also frequent, and there are some tussocks of the uncommon hybrid *Carex x turfosa*. Of the parent plants, *Carex nigra* and *Carex elata*, only the latter was observed in the plot and not in quadrats. The bryophyte ground layer is mostly *Brachythecium rutabulum* and *Kindbergia praelonga*, with less frequent wetland mosses such as *Calliergonella cuspidata*. Indicators of poor condition such as *Urtica*, *Galium aparine* and *Anthriscus sylvestris* are infrequent. Mean number of species per quadrat at 14.80 is a little higher than the last plot, and the fit to M22a is reasonable.

Summary of records and events

The plot was reclaimed from scrub and the scrapes made in winter 2005. The plot has been mown annually in summer since then, with the cuttings removed.

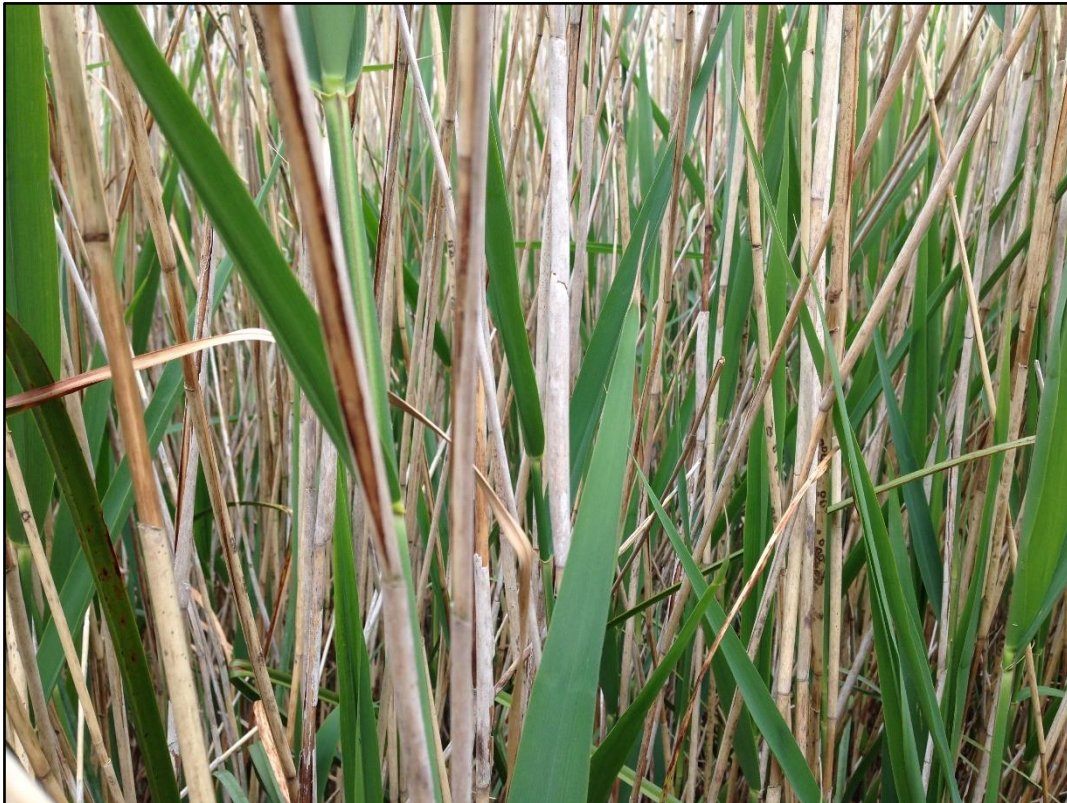
Relation to past and target conditions

No particular targets were seen for this community, and there are no previous Plot records with which to assess general direction of travel.

3.3 BNF03 S25c *Cladium Fen*, West Side of Blo' Norton Fen

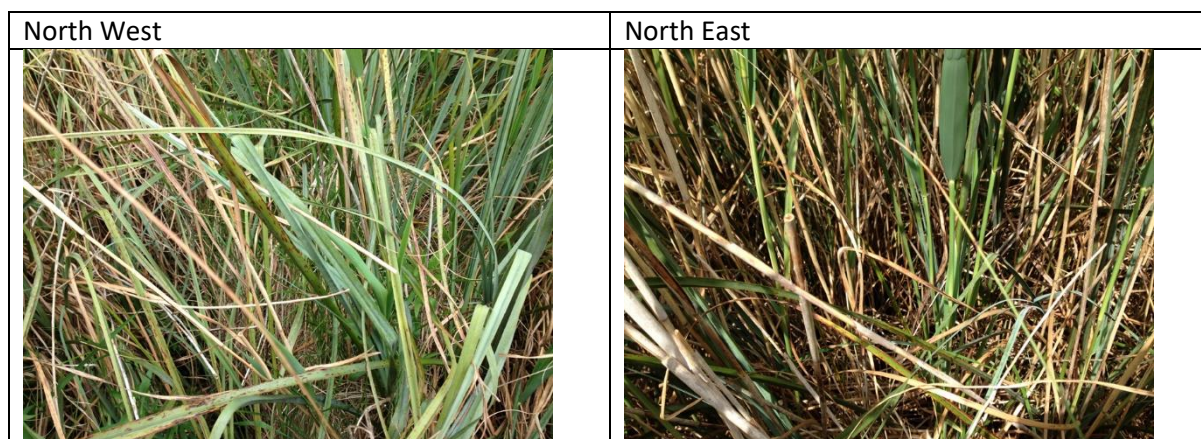
3.3.1 Photographic Record

BNF03: S25c *Cladium Fen*, West Side of Blo' Norton Fen. View taken from TM 01953 789845, looking north.



BNF03: S25c *Cladium Fen*, West Side of Blo' Norton Fen. Quadrants





3.3.2 Vegetation Structural Characters

Monitoring Plot		BNF03				
Recorder		Mike Harding				
Survey Date		30 May 2020				
Character of the ground surface						
Overall flat peat with gentle surface decline south towards the river. Within this is a hollows and holes topography from historic peat digging. There is a thick layer of litter overlying the peat surface. There is standing water in the hollows.						
Soil Wetness						
Dry, dusty		Dry, firm		Slightly damp		Moist
						Wet
						Saturated
						IIII
	Attribute	Quadrant				Average
		SW	SE	NW	NE	
Layer height	Standing water (cm)	0	7	0	15	5.5
	Plant litter (cm)	40	15	30	70	38.75
	Woody seedlings (cm)	0	0	0	0	0
	Large sedges / rushes (cm)	190	70	190	130	145
	Reed-like grasses (cm)	220	240	200	240	225
	Woody saplings (cm)	0	0	0	0	0
Cover value	Standing water (%)	0	75	0	80	38.75
	Trampling (%)	0	0	0	0	0
	Dunging (%)	0	0	0	0	0
	Bare ground (%)	0	0	5	6	2.75
	Plant litter (%)	95	70	95	95	88.75
	Bryophytes (%)	2	0	0	0	0.5
	Woody seedlings (%)	0	0	0	0	0
	Large sedges / rushes (%)	80	10	90	95	68.75
	Reed-like grasses (%)	40	90	5	10	36.25
	Woody saplings (%)	0	0	0	0	0

3.3.3 Floristic Sampling

Monitoring Plot	BNF03
Recorder	Mike Harding
Survey Date	30 May 2020

	Sample Number, 1m ²																				Frequency 2020
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<i>Phragmites australis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P	P	P	95
<i>Cladium mariscus</i>	P	P		P	P		P	P	P	P	P	P	P	P	P		P	P	P		80
<i>Eupatorium cannabinum</i>	P		P	P		P	P	P	P		P		P	P			P		P	P	65
<i>Juncus subnodulosus</i>	P	P			P				P				P				P	P		P	40
<i>Lythrum salicaria</i>	P			P						P		P	P			P	P			P	40
<i>Carex elata</i>					P				P	P			P		P	P				P	35
<i>Calamagrostis canescens</i>	P			P			P				P				P			P			30
<i>Mentha aquatica</i>	P				P				P					P	P			P			30
<i>Vicia cracca</i>	P			P					P		P		P								25
<i>Filipendula ulmaria</i>				P			P	P			P								P		25
<i>Galium uliginosum</i>			P						P			P			P					P	25
<i>Calliergonella cuspidata</i>	P				P								P					P			20
<i>Phalaris arundinacea</i>			P			P										P				P	20
<i>Carex acutiformis</i>		P														P				P	15
<i>Calystegia sepium</i>				P							P								P		15
																					Mean
Total Number Species	9	4	4	8	6	3	5	4	8	4	7	4	8	3	6	5	5	8	3	8	5.6

3.3.4 Commentary

Vegetation structure

This is a tall (225cm) and very dense vegetation, a mix of *Cladium*, reed and sparse associates. It has not been managed for 4+ years, being on a longer rotation, and has therefore accumulated significant ground litter with little bare ground. Where there are ground hollows, standing water can be extensive and quite deep. Because of the density of vegetation and extensive litter, there is little in terms of ground layer and gaps in the vegetation are few.

Plot Floristics

The plot is dominated by tall and dense mixtures of *Cladium* and *Phragmites*. There is a trend for the stand to have denser *Cladium* toward the north of the plot with denser *Phragmites* to the south, closer to the river. Within this matrix there is frequent *Juncus subnodulosus* and some patches of *Calamagrostis canescens* on raised and slightly dryer areas, although it is not frequent in the quadrats. The main fen associates are tall herbs such as *Eupatorium cannabinum*, *Lythrum salicaria* and tussocks of *Carex elata*. Where the dense reed/sedge canopy is a little more open, smaller herbs such as *Mentha aquatica* and *Filipendula ulmaria* can persist. The other main element are the climbers and sprawlers – *Vicia cracca*, *Calystegia sepium* and *Galium uliginosum*. On the ground there are occasional patches of the fen moss *Calliergonella cuspidata*, but cover is always low.

Because of the density of the vegetation, the community is relatively species-poor with a mean number of species per quadrat of 5.6. It is a reasonable fit to the *Cladium mariscus* sub-community of S25 *Phragmites australis*-*Eupatorium cannabinum* fen.

Summary of records and events

The last date of mowing is not known but the Plot is in rotation for 4-6 year summer cutting cycle.

Relation to past and target conditions

The overall S25c community is being maintained but the community would benefit from more frequent summer mowing, to reduce the frequency and dominance of reed and to open the stand up a little to enhance species richness.

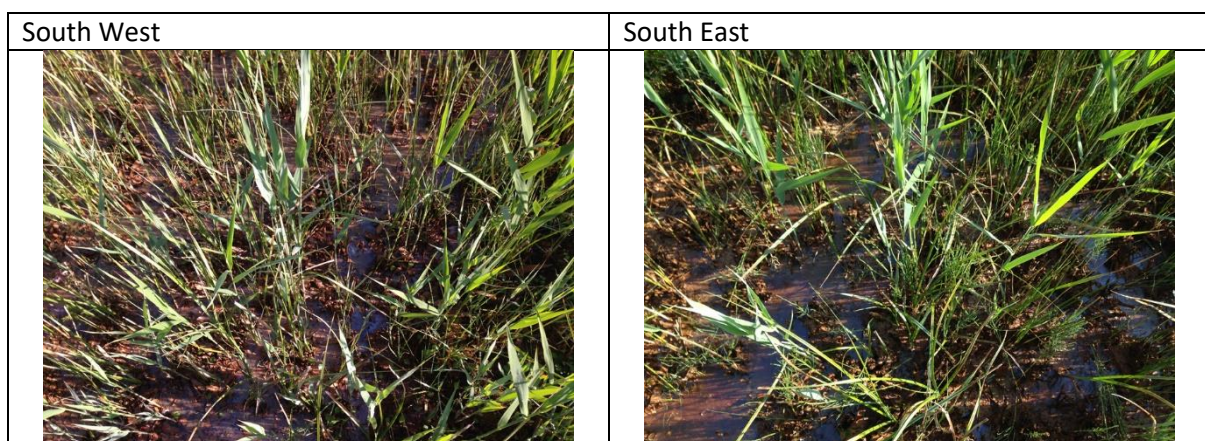
3.4 BNF04 M22c *Schoenus nigricans*-*Juncus subnodulosus* mire, *Caltha palustris*-*Galium uliginosum* sub-community East Side of Blo' Norton Fen

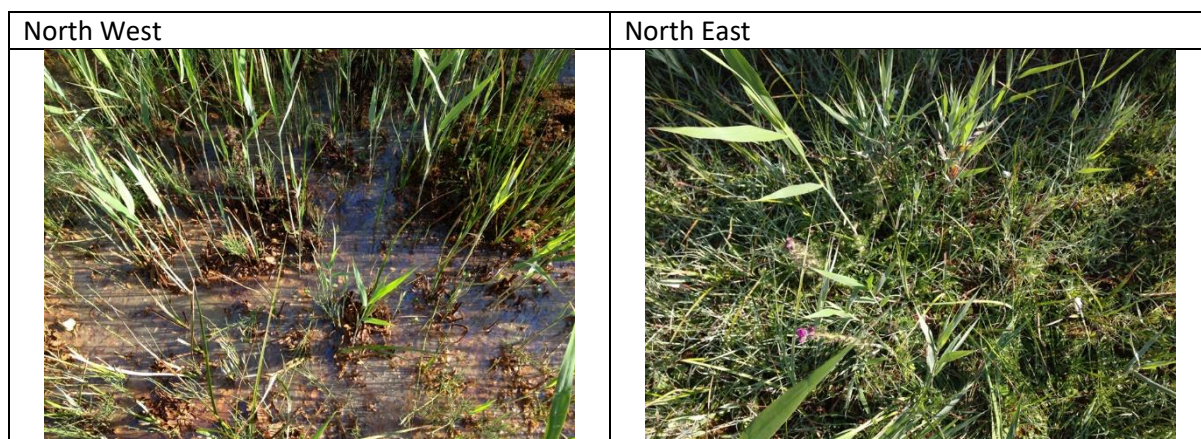
3.4.1 Photographic Record

BNF04 M13c *Schoenus nigricans*-*Juncus subnodulosus* mire, *Caltha palustris*-*Galium uliginosum* sub-community East Side of Blo' Norton Fen. View from TM 01998 78968 looking north.



BNF04 M13c *Schoenus nigricans*-*Juncus subnodulosus* mire, *Caltha palustris*-*Galium uliginosum* sub-community Quadrants





3.4.2 Vegetation Structural Characteristics

Monitoring Plot		BNF04: M13c <i>Schoenus -Juncus mire</i> , <i>Caltha palustris-Galium uliginosum</i> sub-community East Side of Blo' Norton Fen				
Recorder		Mike Harding				
Survey Date		1 st June 2020				
Character of the ground surface						
Overall a level surface of fen peat, but with many hollows from former peat diggings. The hollows are especially deep in the north-west corner where the habitat is more pool than fen, less so in the south and east where the habitat is more wet fen with hollows. Further topographical heterogeneity is given by large vegetation tussocks, especially <i>Schoenus</i> , <i>Molinia</i> and occasional <i>Carex elata</i> .						
Soil Wetness						
Dry, dusty		Dry, firm		Slightly damp		Moist
						Wet
						Saturated
						IIII
	Attribute	Quadrant				Average
		SW	SE	NW	NE	
Layer height	Standing water (cm)	5	3	10	0	4.5
	Plant litter (cm)	2	2	3	2	2.5
	Woody seedlings (cm)	15	0	0	20	8.75
	Large sedges / rushes (cm)	50	45	40	40	43.75
	Reed-like grasses (cm)	70	70	50	75	66.25
	Woody saplings (cm)	0	0	0	0	0
Cover value	Standing water (%)	75	50	75	0	50
	Trampling (%)	0	0	0	0	0
	Dunging (%)	0	0	0	0	0
	Bare ground (%)	5	30	15	10	15
	Plant litter (%)	20	10	10	30	17.5
	Bryophytes (%)	25	30	20	40	28.75
	Woody seedlings (%)	5	0	0	10	3.75
	Large sedges / rushes (%)	25	20	20	25	22.5
	Reed-like grasses (%)	35	30	20	10	23.75
	Woody saplings (%)	0	0	0	0	0

3.4.3 Floristic Sampling

Monitoring Plot	BNF04
Recorder	Mike Harding
Survey Date	1 st June 2020

	Sample Number																				Frequency 2020
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<i>Phragmites australis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Equisetum palustre</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	100
<i>Cladium mariscus</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P		90
<i>Hydrocotyle vulgaris</i>	P	P	P	P	P	P	P	P	P		P	P		P	P		P	P	P	P	85
<i>Calliergonella cuspidata</i>	P	P	P	P	P	P	P	P	P	P	P			P		P	P	P	P		85
<i>Campylium stellatum</i>	P	P	P	P	P		P	P	P		P	P		P	P		P	P	P	P	80
<i>Mentha aquatica</i>		P	P	P	P	P	P		P		P	P		P	P		P	P	P	P	75
<i>Juncus subnodulosus</i>	P	P	P	P	P		P	P			P	P	P		P	P	P		P		70
<i>Carex panicea</i>	P	P	P	P	P		P	P	P		P	P			P			P	P	P	70
<i>Pedicularis palustris</i>	P		P	P	P	P	P				P	P	P	P		P	P	P	P		70
<i>Cirsium palustre</i>	P	P	P	P	P	P	P	P	P		P	P			P			P			65
<i>Potamogeton coloratus</i>	P					P	P			P			P	P		P	P	P	P	P	55
<i>Filipendula ulmaria</i>	P	P	P	P	P			P	P		P	P			P			P			55
<i>Galium uliginosum</i>		P	P	P	P			P	P		P	P			P			P	P		55
<i>Alnus glutinosa seedling</i>	P	P	P					P	P			P			P		P	P		P	50
<i>Valeriana dioica</i>	P	P			P			P	P		P				P			P	P		45
<i>Schoenus nigricans</i>	P	P	P	P	P										P			P	P		40
<i>Eupatorium cannabinum</i>		P		P	P				P			P			P			P	P		40
<i>Molinia caerulea</i>	P	P			P				P			P			P			P			35
<i>Sanguisorba officinalis</i>				P		P	P		P		P	P									30
<i>Lythrum salicaria</i>				P		P					P			P		P			P		30

<i>Carex lepidocarpa</i>	P				P						P				P				P		25	
<i>Holcus lanatus</i>		P	P					P	P						P						25	
<i>Oenanthe lachenalii</i>		P				P					P					P			P		25	
<i>Lathyrus pratensis</i>		P		P	P			P			P										25	
<i>Chara vulgaris</i>												P				P	P		P	P	25	
<i>Fissidens adianthoides</i>		P	P								P								P		20	
<i>Lophocolea bidentata</i>								P			P				P				P		20	
<i>Cratoneuron filicinum</i>		P	P																P		15	
<i>Bryum pseudotriquetrum</i>								P				P								P	15	
<i>Angelica sylvestris</i>	P								P												10	
<i>Epipactis palustris</i>		P		P																	10	
<i>Silene flos-cuculi</i>								P			P										10	
<i>Aneura pinguis</i>									P											P	10	
<i>Chara hispida</i>																P					5	
<i>Pellia endiviifolia</i>																				p	5	
<i>Carex elata</i>												P									5	
<i>Salix seedling</i>																					0	
																						Mean
Total Number Species	18	23	18	19	19	12	13	18	19	5	22	19	7	9	20	10	11	21	22	10	15.75	

3.4.4 Commentary

Vegetation structure

The Plot is mostly mire with some shallow hollows and standing water, but the north-west area, spreading across the northern and western margin of the plot, has much deeper pools with more extensive open water. In the fenny areas, there is a denser tier of rushes, grasses and fine-leaved sedges, with a rich associated flora of fen dicots and a dense ground layer of bryophytes. In the deeper pools, the vegetation is much simpler, often with *Chara* and *Potamogeton* in the pools with reduced cover of bryophytes and a much less dense and complex upper tier of mostly reed, *Cladium* and *Equisetum*. There are of course many areas where these two types inter-grade. In the fenny areas, short scrubby growth of alder occurs either as fresh seedlings or regrowth of cut stumps.

Floristics

This is the most species-rich of the four plots although not perhaps by the margin expected for a type of M13.

It is characterised by mire species typical of base-rich and low nutrient conditions – *Schoenus nigricans*, *Carex lepidocarpa*, *Carex panicea*, *Valeriana dioica*, *Cladium*, *J. subnodulosus*, *Pedicularis palustris*, *Molinia caerulea* and the bryophyte *Campylium stellatum*. Less frequent are *Epipactis palustris* and a range of expected rich fen species such as *Carex elata*. Many of these species are at a lower frequency than would be expected for M13c. The bryophyte layer, while more extensive than for other plots, is not as diverse as might be expected, with many rich fen bryophytes at low frequency. Reflecting the very wet, largely semi-aquatic conditions of the pools are *Potamogeton coloratus* and the *Charas*.

The sward includes *Sanguisorba officinalis* and *Oenanthe lachenalii*, two species usually infrequent in such mires but distinctive of the Little Ouse - Waveney valley fens.

The reason for the flora not being as calcareous and low nutrient as expected for M13 is likely to be related to the irrigating water source. Compared to the Thelnetham Fens south of the river, especially Middle Fen, groundwater supporting the site may be more strongly influenced by shallow Drift aquifers which are less calcareous and more elevated in nutrients than the water derived from Chalk.

Of particular concern is the heavy deposits of ochre recorded in June 2020 (see photo). These orangey deposits are likely to be derived from iron-rich waters flushing from Drift sands, rather than being released from peats. Ochreous waters are likely to be comparatively base-poor and with lower redox than groundwater derived from chalk.

This is rather speculative, as no detailed shallow hydrogeological investigations have been made at the site to explain the ochre or the relatively base-poor condition of the Plot. Also reducing species-richness, especially in the larger pools, will be the depth of still water which few true fen species can tolerate. The pools are also where ochre collects, affecting aquatic and semi-aquatic species. The collection of ochre and associated water

quality in the pools may be at least part of the reason why samples located in the deeper pools are especially species-poor.



Summary of records and events

The plot is mown every year in late summer. This has been the management for at least the last 10 years. Scrub is removed during mowing.

Relation to past and target conditions

The Plot is very similar to that described in the most recent NVC survey (OHES 2012) . Targets have not been defined for the community but the overall condition of the vegetation is being maintained.

The water quality issues described above are however a concern and should be investigated.

4. REFERENCES

- Dobson, Frank. S. (2005). *Lichens. An Illustrated Guide to the British and Irish Species*. The Richmond Publishing Co. Ltd., Slough.
- OHES (2012) *National Vegetation Classification survey of Blo' Norton Fen SSSI Including Betty's Fen 2012*. Unpublished report to Little Ouse Headwaters Project.
- Hill M.O., Blackstock T.H., Long D.G. and Rothero G.P. (2008) *A Checklist and Census Catalogue of British and Irish Bryophytes*. British Bryological Society, Middlewich.
- Rodwell, J.S. (ed.) (1991). *British Plant Communities. Volume 2. Mires and Heaths*. Cambridge University Press.
- Rodwell, J. S. (ed.) (1992). *British Plant Communities. Volume 3. Grassland and montane communities*. Cambridge University Press.
- Rodwell, J. S. (ed.) (1995). *British Plant Communities. Volume 4. Aquatic Communities, Swamps and Tall Herb Fens*. Cambridge University Press.
- Rodwell, J. S. (ed.) (2000). *British Plant Communities. Volume 5. Maritime Communities and Vegetation of Open Habitats*. Cambridge University Press.
- Stace C. (2019) *New Flora of the British Isles*. Fourth Edition. C&M Floristics