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Condition assessments of The Frith and The Lows, South Lopham, Norfolk

2006

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Work undertaken on behalf of:
Helen Smith
Little Ouse Headwaters Project

SUMMARY

1. The Frith and The Lows are two units of land in South Lopham, Norfolk under the management control of the Little Ouse Headwaters Project.
2. Ecology Land and People (ELP) has been engaged by the Project to set up and undertake an assessment of the condition of both units, in line with Common Standards Monitoring (JNCC, 2004a). Fieldwork was carried out on both sites in September 2005.

The Frith and The Lows Fields, South Lopham, Norfolk

Site condition assessment Using Common Stands Monitoring

September 2005

3. The report details the character of the units in terms of their constituent habitats and vegetation. The Frith is a grassland with a sward on the low, fertile soils, while the Lows is a grassland on broad terraces to the north. In the south-east corner, the terrace is degraded and this lower land is occupied by a rush-pasture, which is assigned to the M310 *Holcus-juncus* community.
4. The Frith is a grassland with a sward, with a within the NVC. This sward grades to fen meadow on the lower field, much of which is referable to the M22 *Juncus-Grossa* community, though the vegetation is often overrun by bulky sedges and grasses.
5. ELP has developed criteria for targets by which the future conservation condition of the sites can be assessed. It changes in condition allow the effects of management on the swards to be judged. These targets refer to various attributes of the floristic composition and structure of each sward. They are derived from Joint Nature Conservation Committee's Guidance Manual (JNCC, 2004a). Targets are assessed to be favourable, satisfactory or unfavourable.
6. The results of the assessment indicate that management has been secured for each habitat feature on both sites and that the initial stages of management have been implemented to good effect. It is also required that it is the sustained future management that will effect the restoration and development of both sites.
7. For the dry grasslands, regarded as still immature and responding to the fertile soils of their agricultural history, the currently unfavourable attributes are related to their floristic composition, as both nettle and creeping thistle populations are present, and the suite of potential colonising species from surrounding sites has not yet established.

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SUMMARY

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2. Ecology Land and People (ELP) has been engaged by the Project to set up and undertake an assessment of the condition of both units, in line with Common Standards Monitoring (JNCC, 2004a). Fieldwork was carried out on both sites in September 2005.
3. This report defines the character of the units in terms of their constituent habitat features. Much of The Frith is a young, rather nutrient-rich dry sward on the low, sandy river terrace beside the Little Ouse. It is referable in broad terms to U1 *Festuca-Agrostis-Rumex* grassland within the National Vegetation Classification (NVC). In the south-east corner, the terrace is degraded and this lower land is occupied by a rush-pasture, which is assigned to the MG10 *Holcus-Juncus* community.
4. The upper slope of The Lows is occupied by a dry, fertile grassland, with a somewhat mesotrophic character. It is not assignable to a single community within the NVC. This sward grades to fen meadow on the lower field, much of which is referable to the M22 *Juncus-Cirsium* community, though the vegetation is often overrun by bulky sedges and grasses.
5. ELP has developed criteria for targets by which the nature conservation condition of these features has been assessed. Subsequent changes in condition allow the effects of management on the swards to be judged. These targets refer to various attributes of the floristic composition and structure of each sward. They are derived from Joint Nature Conservation Committee's Guidance Manual (JNCC, 2004b). Targets are assessed to be favourable, satisfactory or unfavourable.
6. The results of the assessment indicate that management has been secured for each habitat feature on both sites and that the initial stages of management have been implemented to good effect. It is also remarked that it is the sustained future management that will effect the restoration and development of both sites.
7. For the dry grasslands, regarded as still immature and responding to the fertile soils of their agricultural history, the currently unfavourable attributes are related to their floristic composition, as both nettle and creeping thistle populations are present, and the suite of potential colonising species from surrounding sites has not yet established.
8. For the rush-pasture and fen meadow, restoration efforts should be directed to altering the structures of the swards at both sites, by restoring the rush-dominated swards, developing the role of grazing and by reducing litter and other sources of available nutrients.
9. Lastly, recommendations are made on regularly repeating the assessment, and integrating the results into the Project's decision-making for management of these sites.

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I. INTRODUCTION

The Frith and The Lows are two units of land in South Lopham, Norfolk under management control of the Little Ouse Headwaters Project. Ecology Land and People (ELP) has been engaged by the Project to set up and undertake an assessment of the condition of both units, in line with Common Stands Monitoring (JNCC, 2004).

This report defines the character of the units in terms of their constituent habitat features and develops criteria for targets by which the nature conservation condition of these features has been judged. The results of the assessment indicate that, while the initial stages of management have been implemented to good effect, it is the sustained future management that will effect the restoration and development of both sites.

2. HABITAT DEFINITIONS

Both The Frith and The Lows are located in the headwaters of the Little Ouse, and are associated with several landscape elements within the valley side. The units have come under the management control of the Little Ouse Headwaters project, which is in the process of securing appropriate grazing and supplementary management regimes to maintain and enhance the natural and landscape values of the fields.

2.1 The Frith

This site is situated on the low, sandy terrace bordering the modern course of the Little Ouse. The main field is on the free-drained loamy sands and sandy loams of the terrace plateau and is composed of dry, largely improved grassland. Casual observation suggests that the characteristics of the sward include:

- dry, mesophilous grass sward dominants
- agricultural weeds, notable nettle *Urtica dioica* and creeping thistle *Cirsium arvense*
- agriculturally favoured weeds, including chickweed *Stellaria media*
- dry grassland perennials, including yarrow *Achillea millefolium*
- dry grassland ephemerals, including *Geranium molle*

In relation to the National Vegetation Classification (NVC), this sward type approximates to a young and fertile variant of the *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland (U1). The closed sward areas are most similar to an incipient form of the *Anthoxanthum odoratum* sub-community (U1d); the more open areas, where ephemerals have more than an occasional occurrence, has some similarities to the Typical sub-community (U1b). The sward had recently been topped at the time of survey, and was sheep-grazed.

Overall, the field can be regarded as a young, rather nutrient-rich sward within the *Festuca-Agrostis-Rumex* community; as such, the habitat feature cannot be directly compared to U1 grassland, the assessment should select desirable sward characters of its current condition and likely development under appropriate management.

A separate compartment in the south-east corner of the unit descends the gentle slope to the bank of the Little Ouse, and the sandy terrace soils become progressively humic and peat-covered. In this compartment, the sward changes in character, to become a rush-pasture. Casual observation suggests that the characteristics of the sward include:

- tussocks of soft rush *Juncus effusus*, forming a dominant matrix
- a sometimes scattered understorey of agriculturally favoured grasses, notable creeping bent-grass *Agrostis stolonifera*
- wet grassland herbs and grasses, including tufted hair-grass *Deschampsia cespitosa* and lady's smock *Cardamine pratensis*

This sward type approximates to the *Holcus lanatus*-*Juncus effusus* rush-pasture (MG10). The sward is most similar to the Typical sub-community (MG10a). At the time of survey, the sward was accessible to sheep and had been topped; cut rush stems had been collected into piles on the sward.

2.2 The Lows

This site is situated on the peripheral slopes of the Little Ouse Valley. The upper field is located on steeper, free-draining, valleyside slopes, descending to a transitional zone of impeded drainage at its foot. The grassland sward is agriculturally improved, with a limited number of plant species. Casual observations suggest that the characteristics of the sward include:

- dominant, agriculturally productive grasses
- agricultural weeds, notable nettle *Urtica dioica* and creeping thistle *Cirsium arvense*
- agriculturally favoured weeds, including chickweed *Stellaria media*

This sward type does not approximate closely to one particular community within the NVC. It appears to contain elements of young, nutrient-rich mesotrophic grassland, particularly the *Lolium perenne*-*Plantago lanceolata* grassland (MG7e), in combination with the *Arrhenatherum elatius*-*Medicago lupulina* sub-community of the *Lolium perenne*-*Dactylis glomerata* community (OV23d). The lower slopes appear moister and perhaps more nutrient-rich. The stand dominated by creeping thistle and nettle has some affinity with the *Holcus lanatus*-*Poa annua* sub-community of the *Urtica dioica*-*Cirsium arvense* community (OV25a). It is anticipated that a prolonged period of management towards nature conservation objectives by grazing will enable the sward to develop towards the mildly acidophilous *Anthoxanthum odoratum* sub-community of the *Lolium perenne*-*Cynosurus cristatus* grassland (MG6b). The sward had been topped at the time of survey, and was sheep-grazed.

The lower field extends from the footslopes of the valleyside across a ground surface of peat as far as the modern course of the Little Ouse. Each field is dominated by fen meadow, but with extensive patches of tall grasses and broad-leaved sedges. The three fields were ditched at their boundaries. Casual observations suggest that the characteristics of the sward include:

- tussocks of rushes *Juncus* spp., usually forming a dominant matrix
- a sometimes dominant understorey of agriculturally favoured grasses, notable creeping bent-grass *Agrostis stolonifera*
- wet grassland herbs and grasses, including lady's smock *Cardamine pratensis*
- fen meadow species, patchily abundant, including water mint *Mentha aquatica* and purple loosestrife *Lythrum salicaria*
- large patches of tall grasses and sedges, notably common reed *Phragmites australis*, reed canary-grass *Phalaris arundinacea* and pond-sedge *Carex* sp.

This sward type approximates to the *Juncus subnodulosus-Cirsium palustre* fen-meadow (M22), though there are extensive patches of a range of swamp stands, notably those dominated by reed (S25/26), reed canary-grass (S28) and lesser pond-sedge (S7). An area of fen meadow had been topped at the time of survey, and there was evidence of stock trampling.

Photographs showing particular sward characters are discussed in sections 6 and 7.

3. COMMON STANDARDS MONITORING

While the character of The Frith and The Lows can be described in detail by ecological surveys, such work only proves a useful tool for effective management when viewed against criteria that describe the desired, or favourable, condition of the swards.

Common Standards Monitoring provides a system for judging whether sites are in favourable condition, and is intended to inform managers of the effectiveness of their work. The system was developed for use on Sites of Special Scientific Interest (SSSIs), but has been successfully trialled on non-SSSI grasslands. It has the advantage of repeatability, is not entirely dependent on ecological experts, and directly relates to the consequences of management.

The theoretical system is developed from a clear statement of the character of the main conservation features, which often derives from work done in producing a management plan. Each feature is converted into a set of measurable characters (called attributes), with reference to a set of nationally-derived habitat and species characters. The features are assessed in the field: if the characters meet pre-determined targets, that feature is deemed to be in favourable condition overall. For these habitats, this implies that recent management has been adequate to maintain the current condition of the feature, though the assessment will often suggest improvements.

The strength of the CMS system is in its repeatability. Subsequent condition assessments act to monitor the changes in conditions of each feature, and track the success of management. When set against the baseline of the initial assessment, each feature can be allocated to one of the following conditions:

- **Favourable - maintained.** An interest feature should be recorded as *maintained* when its conservation objectives were being met at the previous assessment, and are still being met.
- **Favourable - recovered.** An interest feature can be recorded as having *recovered* if it has regained favourable condition, having been recorded as unfavourable on the previous assessment.
- **Unfavourable - recovering.** An interest feature can be recorded as *recovering* after damage if it has begun to show, or is continuing to show, a trend towards favourable condition.
- **Unfavourable - no change.** An interest feature may be retained in a more-or-less steady state by repeated or continuing damage; it is unfavourable but neither declining or recovering. In rare cases, an interest feature might not be able to regain its original condition following a damaging activity, but a new stable state might be achieved.

- **Unfavourable - declining.** Decline is another possible consequence of a damaging activity. In this case, recovery is possible and may occur either spontaneously or if suitable management input is made.
- **Partially destroyed.** It is possible to destroy sections or areas of certain features or to destroy parts of sites with no hope of reinstatement because part of the feature itself, or the habitat or processes essential to support it, has been removed or irretrievably altered.
- **Destroyed.** The recording of a feature as destroyed will indicate the entire interest feature has been affected to such an extent that there is no hope of recovery, perhaps because its supporting habitat or processes have been removed or irretrievably altered.

4. ASSESSMENT METHODOLOGY

For this assessment, The Frith was judged in terms of two habitat features (dry grassland and fen-meadow), and The Lows as dry grassland and rush pasture. No species features were identified.

Each feature was characterised in terms of a number of nationally derived attributes, which were judged to summarise the key characters of each feature as they occur in the local context.

The assessment in the field involved undertaking a walkabout survey to identify and map the general locations of vegetation stands and pertinent sward and ground features. This general overview was supplemented by a more detailed consideration of ten sample areas, selected to be representative of the range of vegetation characters and conditions encountered.

Each attribute is given a unique code, eg. FDE = The Frith, Dry grassland, Extent. The commentaries following each attribute in section 5 are intended to clarify the attribute and qualify the target set for it. The frequency for target species refers to the likelihood of encountering that species in a sample area, where:

Rare is	0-20 %
Occasional is	21-40 %
Frequent is	41-60 %
Constant is	More than 60 %

Each attribute was examined in the field, and a judgement made to determine an appropriate target for each attribute. The attributes for each feature, and a rationale for their stated targets, are given in the following section.

A series of judgements was then made about the state of each attribute at The Frith and The Lows, and is given in sections 6 and 7, with an accompanying sketch map, photographs of selected attributes, and observations about current conditions and the anticipated direction of future sward attributes.

It is recommended that this assessment is repeated regularly in its early years, and integrated into the Project's decision-making regarding management of these two sites. It is envisaged that an annual re-assessment at the end of the growing season would be appropriate for the first three years, to provide strong early steerage of management

practices. It is recommended that these assessments are reviewed in the field with relevant site managers. If this process helps to refine visual observations of favourable condition, and the range of attributes to manage for, then the frequency of assessment may be reduced to a biennial programme.

5. ATTRIBUTE SELECTION AND TARGET-SETTING

5.1 Dry grassland

5.1.1 Contextual factors

Three key factors affect the targets that can usefully be set.

Agricultural origin: Neither area of dry grassland can be regarded as long-term semi-natural habitat, and their agricultural history affects the conservation objectives for both fields in limiting the current suitability for species-rich swards of diverse structure. The targets set for each attribute reflects this current condition, and are intended to favour sward characters that tend towards a desirable future condition.

Multiple objectives: The techniques used to manage both swards are not solely to enhance the nature conservation value of the sward, but have other objectives, including stock-rearing, landscape and amenity. Nonetheless, the monitoring system can act in tandem with the management objectives for the fields in steering their condition towards greater biodiversity value.

Limited immigration: A further factor affecting both areas of dry grassland is related to the potential for immigration of appropriate species from nearby sites. These would appear to be restricted to areas of unimproved terrace vegetation, concentrated along the southern margins of Redgrave and Lopham NNR (Stone et al, 2004) and the smaller fens to the west, including Hinderclay Fen (Stone, 2006). If such species are not able to immigrate, it is likely that only low targets can be set for the numbers of favourable species occurring on either site.

5.1.2 Attributes for The Frith

This field appears to be somewhat drought-prone. The presence of the two dry species groups (see section 2.1) indicates that at least part of the sward is capable of favouring drought-tolerant species. The soil reaction would also seem to be mildly acidic. These two factors suggest that attributes can be drawn up with reference to the national set drawn up for dry acid grasslands and modified to ensure that the characters associated with less acid conditions are brought to the fore.

Frith: Dry grassland

Attribute FDE	Target
Extent	No significant loss of feature

In general, it is recommended that there should be no loss in extent of this stand of vegetation. Trivial reductions due to slightly increased poaching in the vicinity of gateways or other localised disturbance that frequently occur on lowland farms are not

considered as serious losses. Similarly, it may be appropriate to accept minor loss to ensure continuation of suitable site management, e.g. the installation of a water source for livestock. In exceptional circumstances, a target may be set to accept some loss to other habitat (e.g. to scrub, or if required by specialist taxa).

Attribute FDP	Target
Sward composition: frequency of positive indicators	<p>Two or more species at least frequent: <i>Festuca rubra</i>, <i>Holcus lanatus</i>, <i>Agrostis capillaris</i></p> <p>Two or more species at least occasional: <i>Cerastium fontanum</i>, <i>Rumex acetosella</i>, <i>Stellaria graminea</i>, <i>Aphanes</i> spp., <i>Galium saxatile</i>.</p>

In recognition of the impracticality of monitoring species diversity in full, the frequency of a sub-set of component species is used to gauge condition. It is intended that such species will indicate whether the ecological conditions are suitable for the maintenance of the local form of grassland. Where possible the selected species should be characteristic of the dry character of most of this sward, and reflect a gradual decline in the levels of fertility.

For the most part, it is predicted that their frequency (and/or cover) will decline in the face of unfavourable developments, notably eutrophication impacts. Alterations in nutrient status may take place as a result of fertilizer treatment, as well as atmospheric sources. Changes in indicator species frequency may also come about through excessive grazing and other disturbances, as well as successional development following management neglect.

The target is set to register a low or declining frequency of key indicators as unfavourable.

Attribute FDH	Target
Sward structure: herb/grass ratio	20-50%

The relative cover of grasses and forbs provides a coarse indication of conservation status. In general, conservation swards in good condition have a higher broad-leaved herb component compared to agricultural grasslands. It should be noted that some broad-leaved herbaceous species (e.g. *Trifolium repens* and *Cirsium arvense*) might respond to fertilizer treatment so that a high forb cover is not necessarily desirable. The target range for this sward is a somewhat narrower range than for The Lows, to reflect its character.

The target is set as a trigger for the extremes of favourable status, and as an indication of trends of this attribute.

Attribute FDW	Target
Sward composition: frequency of negative indicators – agricultural weeds	<i>Cirsium arvense</i> and <i>Urtica dioica</i> should be more than frequent throughout the sward or together more than 10% cover.

Agricultural weeds, such as *Cirsium arvense*, *Urtica dioica* and *Rumex obtusifolius*, may indicate an increase in soil nutrient levels when they become prominent in previously low-nutrient status swards. Other forms of disturbance may also result in an increase in weed species; a well-known example is *Senecio jacobaea* which responds to poaching, associated with high grazing levels.

The target is set to register high or increasing frequency/cover as unfavourable.

Attribute FDF	Target
Sward composition: cover of negative indicators – agriculturally favoured species	<i>Agrostis stolonifera</i>, <i>Stellaria media</i> and <i>Glechoma hederacea</i> should collectively be at no more than 10 % cover

Other negative trends, especially again indicating eutrophication, are due to increases in agriculturally favoured species. Such taxa may be present at low cover in semi-natural mesotrophic swards. All listed species are good markers for unfavourable condition if present at high cover, but cover estimation may be problematic under certain conditions, e.g. when heavily grazed.

The target is set to register high or increasing frequency/cover as unfavourable.

Attributes FDR	Target
Sward composition: cover of negative indicators - rank grasses	<i>Arrhenatherum elatius</i> and <i>Dactylis glomerata</i> together should cover less than 10% of the sward.

Another group of negative indicators are bulky grasses. These are characteristic at moderate cover in a range of good quality semi-natural lowland grasslands, but when unchecked by grazing or cutting, may become overwhelmingly abundant, suppressing a number of less competitive associated taxa. *Arrhenatherum elatius* and *Dactylis glomerata* are good indicators of under-grazed, rank stands, and therefore increasing or high cover will generally indicate unfavourable conditions.

The target is set to register high or increasing cover as unfavourable.

Attribute FDS	Target
Sward composition: cover of negative indicators – scrub(including <i>Rubus fruticosus</i>) and tree species, and bracken	Woody species and bracken together should be at no more than 5% cover.

More adverse and obvious successional changes following management neglect in grasslands are demonstrated by incursion and spread of bracken *Pteridium aquilinum*, scrub and other woody species. The presence of scrub and bracken often provides

structural and ecological diversity to grassland features, and long-established stands that help significantly to support a site's biodiversity value should often be retained. However, scrub and bracken can rapidly invade grassland features if left unchecked by sufficient grazing or management.

The target is to register high or increasing cover as unfavourable.

The target should be used with caution. Scrub and tree cover can form a useful transition habitat across part of a site, but if more than occasional throughout a sward, even at less than 5% cover, scrub and bracken can soon become a problem if grazing levels are not sufficient or if control measures are not being carried out. High scrub cover may be required at sites with specialist invertebrate interest.

Attribute FDT	Target
Sward structure: average height	The target average height for this community is <10 cm.

An attempt is made to set a target for the height of the grassland vegetation, taking into account the particular site conditions, that is not considered to be either over- or under-grazed, both of which may lead to a decline in species diversity. Bear in mind that some invertebrates require a range of sward heights.

Attribute FDL	Target
Sward structure: litter	Average litter cover should be less than 10%

Litter accumulation is often a sign that grassland is being under-managed, with an excess of plant material not being removed by grazing or hay-making. The percentage litter cover can be difficult to estimate, so it is recommended that only a continuous, readily observable layer is included in the cover estimate. Dry grasslands tend to have low levels of litter cover and, although the presence of some litter is acceptable, it is estimated that levels above 15 % would indicate insufficient removal of biomass by grazing or cutting.

The target is set to register high or increasing cover as unfavourable.

Attribute FDB	Target
Sward structure: extent of bare ground	Average extent should be between 5-15%

The percentage bare ground can also be difficult to estimate, so it is recommended that only the bare ground visible without disturbing the vegetation be included in the cover estimate. There is a widely held view that some bare ground is required in many forms of semi-natural lowland grassland to promote regeneration from seed. However, high levels of bare ground brought about by poaching and other disturbance may favour ingress of undesirable and often competitive species, such as *Cirsium arvense* and *Senecio jacobaea*. It is usually recommended that only quite low cover of bare ground (often <5%) is acceptable. For dry grasslands, a higher cover of bare ground is perfectly acceptable, though the extent of bare ground associated with rabbit burrows is taken into account. Indeed, on some parts of the site, particularly where soft loamy sand is the surface material in areas of full sunlight, higher cover of bare ground may be required, at

least locally, to provide suitable micro-habitat for various insect taxa and other invertebrates. For these reasons, a target range of 5-15% is recommended.

The target is set to register high or increasing cover as unfavourable. For this dry grassland, decreasing cover would also be cause for concern.

Care should be taken here, particularly in relation to rabbit warrens. Rabbit grazing is important in maintaining some grasslands, but large population size can lead to undue disturbance and bare ground associated with warren activity. The area of warrens that can be tolerated is at least partially dependent upon site size. As a general guide, localised bare ground around rabbit warrens should be no more than 0.25 ha / 0.5%.

5.1.3 Attributes for The Lows

This grassland occurs on the upper field, which is located on steeper, free-draining, valleyside slopes, descending to a transitional zone of impeded drainage at its foot. This sloping field appears to be more fertile than the dry grassland at The Lows, and supports a more obviously improved flora of neutral conditions. As such, desirable conditions are less easy to characterise from the Common Standards Monitoring system, though such grasslands share many of the same problems.

The basic set of dry grassland attributes are used, and their targets modified to fit this type of sward. Comments are generally the same as for The Frith and are not included; other comments are intended as supplementary considerations.

Attribute LDE	Target
Extent	No significant loss of feature

Attribute LDP	Target
Sward composition: frequency of positive indicators	At least 5 species occasional or more: <i>Festuca rubra</i> , <i>Poa pratensis</i> , <i>Taraxacum officinale</i> agg., <i>Vicia sativa</i> , <i>Plantago lanceolata</i> , <i>Achillea millefolium</i> , <i>Trifolium dubium</i>

The group of indicator species chosen for this grassland is somewhat speculative, as no floristic survey data was available. The intention is to assess the sward against an attribute target composed of appropriate species from the existing sward, coupled with the kinds of species one would anticipate occurring commonly in dry, mesotrophic grassland.

Attribute LDH	Target
Sward structure: herb/grass ratio	10-40%

This target is most likely to be exceeded by an increase in cover of agricultural weeds (see below) rather than sward herbs.

Attribute LDW	Target
Sward composition: frequency of negative indicators – agricultural weeds	<i>Cirsium arvense</i> <i>Urtica dioica</i> No species should be more than frequent throughout the sward or together more than 25% cover.

This attribute is particularly pertinent for agricultural grasslands now in conservation management; the target is comparatively relaxed: in the future, it should be progressively reduced, to occasional and less than 10%.

Attribute LDF	Target
Sward composition: cover of negative indicators – agriculturally favoured species	<i>Lolium perenne</i> <i>Holcus lanatus</i> <i>Trifolium repens</i> No species should be individually at more than 15% cover, or collectively at more than 40% cover.

This attribute is particularly pertinent for agricultural grasslands now in conservation management; the target is comparatively relaxed: in the future, it should be progressively reduced, to 10% (individual) and 25% (collective).

Attributes LDR	Target
Sward composition: cover of negative indicators - rank grasses	<i>Arrhenatherum elatius</i> <i>Dactylis glomerata</i> No more than 15% of the sward

Owing to the dry nature of the sward, routine grazing should ensure this target is met; neglect, or the other hand, could lead to a rapid increase.

Attribute LDS	Target
Sward composition: cover of negative indicators – scrub(including <i>Rubus fruticosus</i>) and tree species	No more than 5% cover

This target should be changed if tree and/or shrub cover were increased as part of planned management.

Attribute LDT	Target
Sward structure: average height	15cm

This target implies continued grazing. If the regime changes to haying, or only periodic grazing, this target should be reviewed.

Attribute LDL	Target
Sward structure: litter	15%

Attribute LDB	Target
Sward structure: extent of bare ground	<10 %

The target is set to encourage a low cover of bare ground as defined. Management should aim for <5%, as the sward is often thin and regeneration from seed possible over much of the sward.

5.2 Fen meadow

The fen meadow attributes apply only to The Lows. The attributes are taken from the Lowland purple moor grass and rush pastures criteria set out in JNCC (2004b).

Attribute LFE	Target
Extent	No significant loss of feature.

The extent of the lowland wetland feature is the total extent of the current vegetation types in The Lows.

The target is always that there should be no loss in area of the wetland feature, unless through a deliberate policy of conversion to another wetland habitat (eg. waterbody or wet woodland).

Attribute LFP	Target
Sward composition: frequency of positive indicators	Five or more at least occasional: <i>Molinia caerulea</i> , <i>Deschampsia cespitosa</i> , <i>Juncus subnodulosus</i> , <i>Galium uliginosum</i> , <i>Lychnis flos-cuculi</i> , <i>Lythrum salicaria</i> , <i>Mentha aquatica</i> , <i>Valeriana officinalis</i>

This attribute refers to the floristic composition of the target community, the rush-dominated fen-meadow. Where areas of fen-meadow are overtaken by tall, dominant species, many of the low-growing herbs and bryophytes may be excluded. As a generic standard, the frequencies of positive indicators are intended to confirm the presence of the target community. The selected species were those viewed in the survey and does not include all species that may be present on the site.

The target is set to register a low or declining frequency of key indicators as unfavourable.

Attribute LFJ	Target
Sward composition: frequency and cover of bulky <i>Juncus</i> spp	All rush species combined: 25-80%

Species which may be characteristic components of the sward (*Juncus* spp) can increase where inappropriate management or changes in hydrology are occurring, such as decreased intensity or timing of cutting or grazing, nutrient enrichment or waterlogging. Rushes may expand to become over-dominant in neglected stands when they may shade out smaller growing species and become highly impoverished. Conversely, the cover of *Juncus* spp. may decline in response to unfavourable treatments including over-grazing and drainage.

The target is set to register both high and low cover as unfavourable.

Attribute LFF	Target
Sward composition: cover of negative indicators – agriculturally favoured species	Examples of negative indicators (agriculturally favoured species): <i>Lolium perenne</i> , <i>Phleum pratense</i> , <i>Glyceria fluitans</i> , <i>Holcus lanatus</i> , <i>Poa trivialis</i> , <i>Ranunculus repens</i> , <i>Trifolium repens</i> No species should be individually at more than 15% cover, or collectively at more than 30% cover.

The target is set to register high or increasing cover as unfavourable.

Attributes LFR	Target
Sward composition: cover of negative indicators - rank grasses and sedges	<i>Phragmites australis</i>, <i>Carex riparia</i>, <i>C. acutiformis</i> and <i>Glyceria maxima</i>. Combined <20%

These are indicators of unwanted trends, inappropriate to the fen-meadow feature. Undesirable non-woody vascular plants species are mainly indicators of succession expressed through enrichment or drying out. These species may include *Phragmites australis*, *Phalaris arundinacea*, *Glyceria maxima*, *Epilobium hirsutum*, *Urtica dioica*, *Carex riparia* and *C. acutiformis*, *Rubus fruticosus* and *Molinia caerulea*, and in some cases these species may be natural/acceptable components or even dominants. Several species currently have this role within The Lows fen meadow. While their presence on the site is welcome in limited areas, their aggressive behaviour in colonizing the fen-meadow is of concern.

The target is set to register high or increasing cover as unfavourable.

Attributes LFS	Target
Sward composition: cover of negative indicators – scrub and tree species	<5% of the sward

Where management by grazing or hay-cutting does not occur over long periods, scrub species can invade. Although wet woodland may constitute an interest feature in some situations, scrub and trees on fens are sometimes regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects. Judgments may also take into account whether the scrub components are growing vigorously, or are scattered and stunted and thus not constituting a threat to the interest feature. In fact, scrub and tree cover can form a useful transition habitat across part of a site

The target is set to register high or increasing cover as unfavourable.

Attribute LFT	Target
Sward structure: average height	The sward should usually be within the range 5-80 cm.

At The Lows, the target is likely to be at the upper limit over areas of the site. Subsequent lodging of tall rush stems exacerbates the problem of heavy shading leading to a rapid reduction in plant species diversity in the target community.

The target is set to register both over- and under-grazed conditions as unfavourable.

Attribute LFL	Target
Sward structure: litter	< 25% cover of the sward.

The percentage litter cover can be difficult to estimate, so it is recommended that only a continuous, readily observable layer is included in the cover estimate. Beyond 25% cover, this would generally indicate insufficient removal of biomass by grazing or cutting.

The target is set to register high or increasing cover as unfavourable.

Attribute LFB	Target
Sward structure: extent of bare ground	Total extent should be < 10% of the sward.

Some bare ground (e.g. that created by cattle poaching) is important for the establishment of short plants, the feeding of birds, or the reproduction of invertebrates. The percentage bare ground can also be difficult to estimate, so it is recommended that only the bare ground visible without disturbing the vegetation be included in the cover estimate.

Target should be set to register high or increasing cover as unfavourable.

5.3 Rush Pasture

The form of rush-pasture at The Frith is not covered by Common Standards Monitoring, as it is a relatively common habitat in Britain. The type of sward is, nonetheless, a valuable form of the local valley landscape, and an assessment system has been drawn up in this context, based on the generic guidance for wet grasslands.

Comments are generally the same as for the fen-meadow attributes are not included; the comments provided are intended to supercede or supplement those provided for the fen-meadow attributes.

Attribute FRE	Target
Extent	No significant loss of feature.

Attribute FRP	Target
Sward composition: frequency of positive indicators	At least three species frequent or constant: <i>Holcus lanatus</i> , <i>Ranunculus repens</i> , <i>Agrostis stolonifera</i> , <i>Trifolium repens</i> ; two species at least rare: <i>Cardamine pratensis</i> , <i>Potentilla anserina</i> , <i>Deschampsia cespitosa</i>

Attribute FRJ	Target
Sward composition: frequency and cover of bulky <i>Juncus</i> spp	All rush species combined: 25-80%

Attributes FRR	Target
Sward composition: cover of negative indicators - rank grasses, sedges and herbs	<i>Arrhenatherum elatius</i> , <i>Poa trivialis</i> , <i>Urtica dioica</i> , <i>Rubus fruticosus</i> agg. should not exceed a combined cover of 5%

Urtica dioica and *Poa trivialis* are the most likely species. It is possible that, with further drying out of the sward, the tall oat-grass *Arrhenatherum elatius* or bramble *Rubus fruticosus* agg. may enter the sward as a negative indicator. This attribute should be periodically reviewed.

Attributes FRS	Target
Sward composition: cover of negative indicators – scrub and tree species	<5% of the sward

Attribute FRT	Target
Sward structure: average height	The sward should usually be within the range 5-75 cm.

Attribute FRL	Target
Sward structure: litter	< 15% cover of the sward.

The percentage litter cover can be difficult to estimate, so it is recommended that only a continuous, readily observable layer is included in the cover estimate. Beyond 25% cover, this would generally indicate insufficient removal of biomass by grazing or cutting.

Attribute LFB	Target
Sward structure: extent of bare ground	Total extent should be < 5% of the sward.

6. CONDITION ASSESSMENT OF THE FRITH

Map 1 shows the location of the areas assessed for the condition of this feature.

The results of the assessment are summarised in Tables 1 and 2, and Photos 1 and 2 have been annotated to highlight those attributes and features of management affecting the condition of this field.

Attributes assessed as 'favourable' imply that the condition of the attribute cannot be faulted. This does not imply that the attribute is in favourable condition throughout the year, or that management is necessarily the primary factor in achieving this status.

Attributes assessed as 'satisfactory' meet the target set for that attribute, but it is considered that the attribute is not dependent on current management, and may be due to the successional state of the sward, or some other factor.

Attributes assessed as 'unfavourable' do not meet the target set for that attribute. This may be a consequence of the successional state of the sward, or may result from inappropriate or inadequate management.

6.1 Dry grassland

Table 1. The Frith – Assessment of the condition of the dry grassland

Code	Attribute	Condition	Photo
FDE	Extent	Favourable	
	Sward composition:		
FDP	Frequency of positive indicators	Unfavourable	
FDH	Herb/grass ratio	Satisfactory	
FDW	Frequency of negative indicators – agricultural weeds	Unfavourable	1
FDF	Cover of negative indicators – agriculturally favoured species	Satisfactory	
FDR	Cover of negative indicators - rank grasses	Favourable	
FDS	Cover of negative indicators – scrub(including <i>Rubus fruticosus</i>) and tree species, and bracken	Favourable	
	Sward structure:		
FDT	Average height	Favourable	
FDL	Litter	Favourable	
FDB	Extent of bare ground	Favourable	

Overall assessment

There is no loss of extent, and the field is in secure management. The structure of the sward is assessed as favourable. Management of the sward composition shows control of rank grasses and scrub, but there is a large agricultural weed population (nettle and

creeping thistle) yet to be satisfactorily controlled. At this stage in the management of the field, this attribute, and the lack of positive indicators of dry, mildly acid grassland, are largely due to the residual effects of its agricultural history.

6.2 Rush pasture

Table 2. The Frith – Assessment of the condition of the rush pasture

Code	Attribute	Condition	Photo
FRE	Extent	Favourable	
Sward composition:			
FRP	Frequency of positive indicators	Satisfactory	
FRJ	Frequency and cover of bulky <i>Juncus</i> spp	Satisfactory	
FRR	Cover of negative indicators - rank grasses, sedges and herbs	Unfavourable	2
FRS	Cover of negative indicators – scrub and tree species	Favourable	
Sward structure:			
FRT	Average height	Favourable	
FRL	Litter	Favourable	
FRB	Extent of bare ground	Favourable	

Overall assessment

There is no loss of extent, and the field is in secure management. The structure of the sward is assessed as favourable. The sward composition is currently below the target conditions. While the range of favourable species is satisfactory, the herb component was found to be only marginally satisfactory, and the cover of nettle notably unfavourable. This may largely be due to drying out of the thin peat bed and the agricultural history of the sward; management considerations are outlined in Photo 2.

7. CONDITION ASSESSMENT OF THE LOWS

Map 2 shows the location of the areas assessed for the condition of this feature.

The results of the assessment are summarised in Tables 3 and 4, and Photos 3-6 have been annotated to highlight those attributes and features of management affecting the condition of this field.

Attributes assessed as 'favourable' imply that the condition of the attribute cannot be faulted. This does not imply that the attribute is in favourable condition throughout the year, or that management is necessarily the primary factor in achieving this status.

Attributes assessed as 'satisfactory' meet the target set for that attribute, but it is considered that the attribute is not dependent on current management, and may be due to the successional state of the sward, or some other factor.

Attributes assessed as 'unfavourable' do not meet the target set for that attribute. This may be a consequence of the successional state of the sward, or may result from inappropriate or inadequate management.

7.1 Dry grassland

Table 3. The Lows – Assessment of the condition of the dry grassland

Code	Attribute	Condition	Photo
LDE	Extent	Favourable	
	Sward composition:		
LDP	Frequency of positive indicators	Unfavourable	
LDH	Herb/grass ratio	Satisfactory	
LDW	Frequency of negative indicators – agricultural weeds	Unfavourable	3
LDF	Cover of negative indicators – agriculturally favoured species	Unfavourable	4
LDR	Cover of negative indicators - rank grasses	Favourable	
LDS	Cover of negative indicators – scrub(including <i>Rubus fruticosus</i>) and tree species	Favourable	
	Sward structure:		
LDT	Average height	Favourable	
LDL	Litter	Favourable	
LDB	Extent of bare ground	Satisfactory	

Overall assessment

There is no loss of extent, and the field is in secure management. The structure of the sward is assessed as favourable. The sward composition is in the early stages of adjustment towards a more favourable condition, and lacks a number of common species that would reflect the dry soil character. The predominance of Yorkshire Fog

Holcus lanatus over the field and of large patches of both creeping thistle and nettle, are current management issues.

7.2 Fen meadow

Table 4. The Lows – Assessment of the condition of the fen meadow

Code	Attribute	Condition	Photo
LFE	Extent	Unfavourable	
	Sward composition:		
LFP	Frequency of positive indicators	Favourable	
LFJ	Frequency and cover of bulky <i>Juncus</i> spp	Satisfactory	
LFR	Cover of negative indicators - rank grasses and sedges	Unfavourable	5
LFS	Cover of negative indicators – scrub and tree species	Favourable	
	Sward structure:		
LFT	Average height	Satisfactory	
LFL	Litter	Unfavourable	6
LFB	Extent of bare ground	Satisfactory	

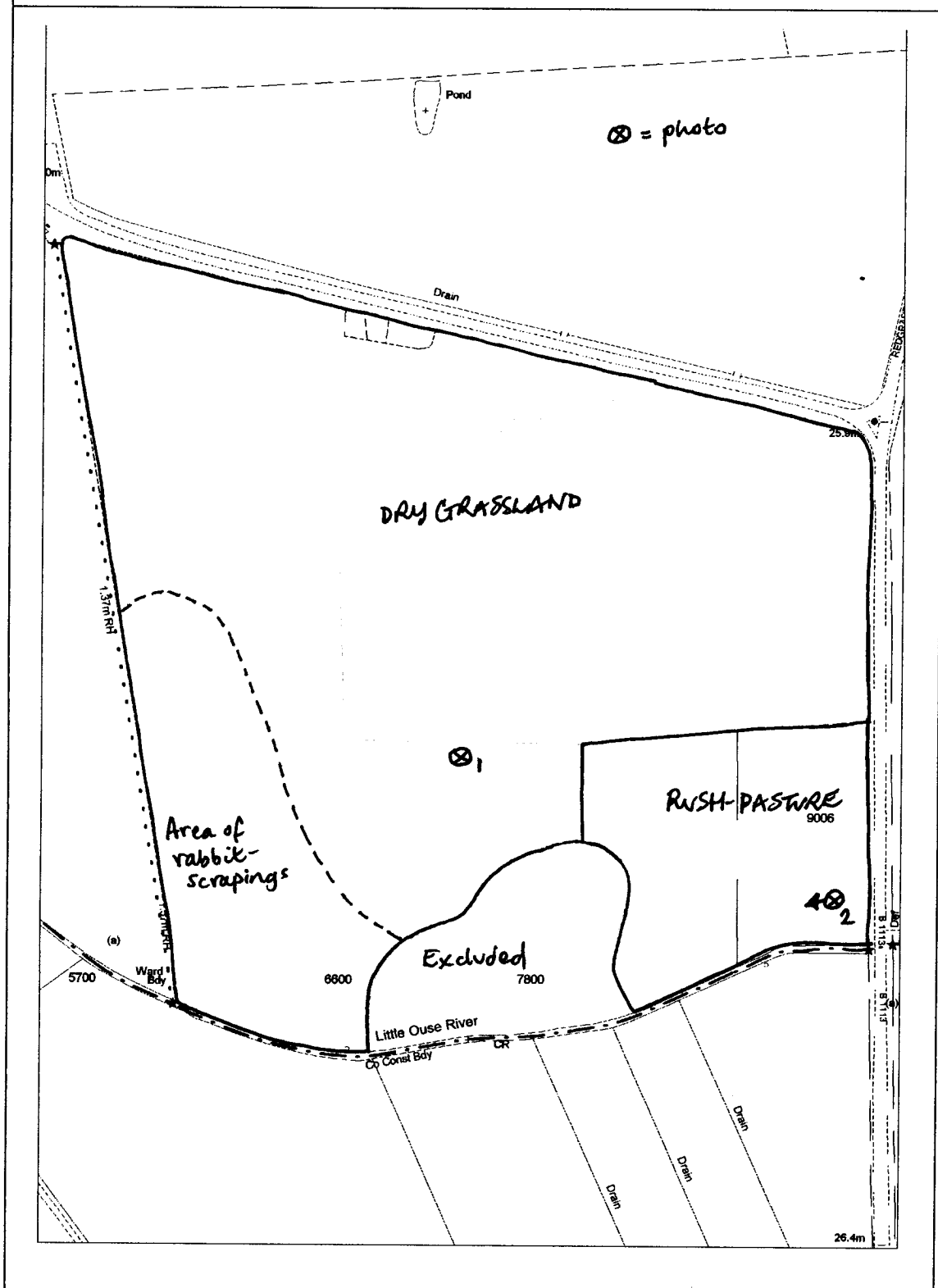
Overall assessment

The target feature is reduced in extent by ingress on its edges by large grasses and sedges. Following a period with no apparent management, the abundance of these species, and the thick litter they deposit, has rendered the current sward composition and structure in an unfavourable condition. Recent cutting management in one field appears to be effecting favourable restoration in this area: continued management by grazing and/or cutting will favour the restoration of the target feature.

8. REFERENCES

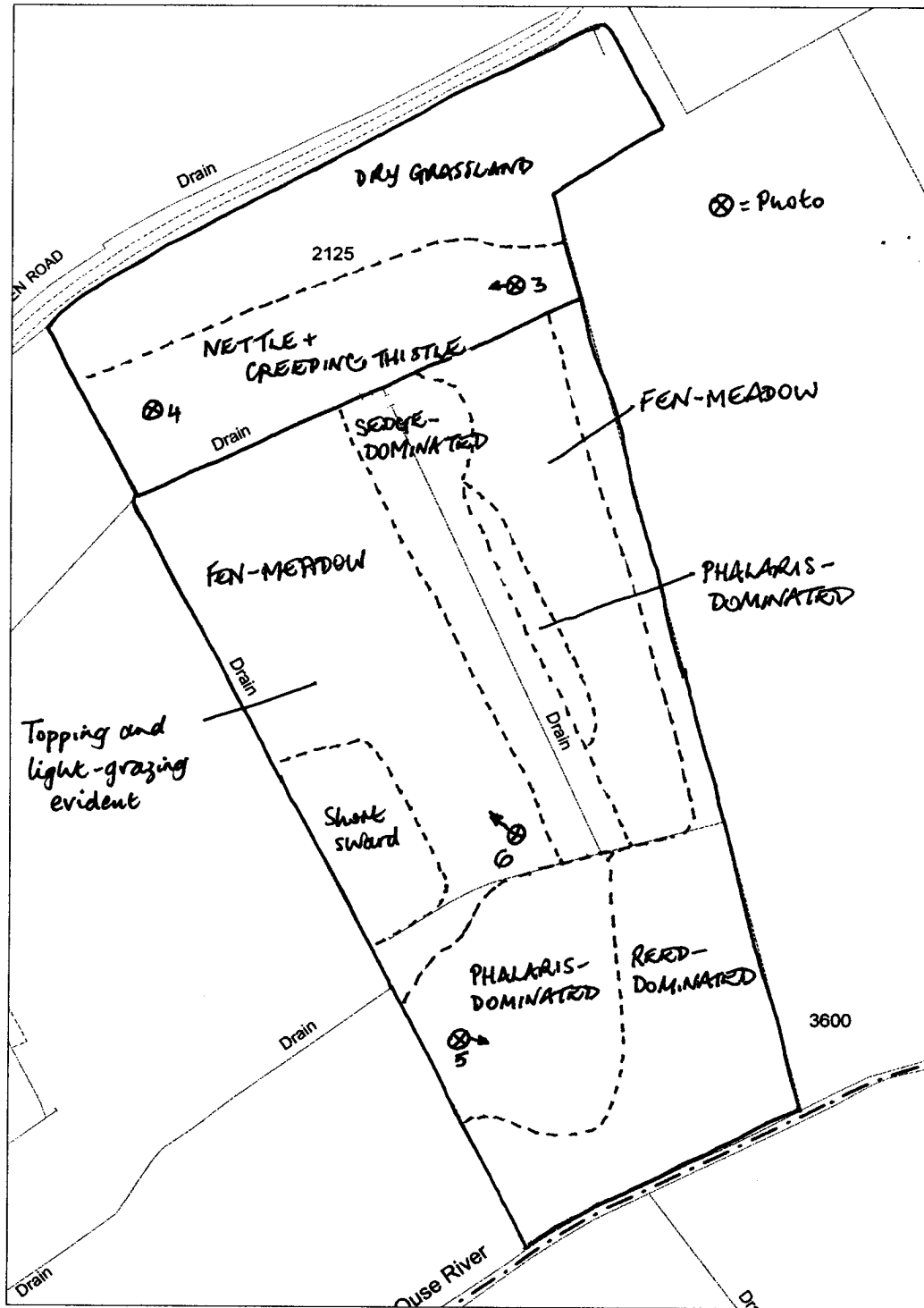
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Map I. The Frith: Sketch of assessed characters



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Map 2. The Lows: Sketch of assessed characters



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Photo 1 – The Frith dry grassland



**Condition assessment :
Sward composition – agricultural
weeds**

The image shows a detail of the sward in the centre of the field. While the current height of the sward is in condition, the strong growth of young nettles, and the evidence of dead stems, suggests that the sward has been topped, but that the nettles have been allowed to develop and re-invigorate their rhizome structure.

Creeping thistle is also evident as a young plant at the bottom-centre of the image.

Photo 2 – The Frith rush pasture



Condition assessment

The image shows two sward characters of concern.

The first is the strong growth of nettles between rush tussocks. This species spreads below ground by rhizomes, as well as over the surface by stolons. Its seeds also enter the sward in gaps in the vegetation. The species is very characteristic of a period of neglect on a somewhat drained sward.

The second is the rush pile, which, along with several others, has been left on the sward. While cutting and collecting the rush is positive, its deposition on the sward, even if it is subsequently removed, is contributing to the spread of nettles. This happens as the early decay of the stems releases nutrients, but is also the result of smothering of the existing plants, and inhibition of seedlings. The creeping nettle stems are quick to colonise in such conditions.

Photo 3 – The Lows dry grassland



**Condition assessment:
Sward composition – agricultural
weeds**

This image shows the long slope of the upper field at the The Lows. The lower half of the field is quite clearly mantled in a mixed canopy of creeping thistle with nettle. This character of the habitat feature may reflect different soil moisture and nutrient conditions prevailing on the lower slopes, exacerbated by previous management. Although the whole sward will take time to adjust to a new management regime, this attribute, in particular, requires persistent attention to attain favourable condition.

It is likely that sward conditions in the affected area will only approach favourable condition after several seasons of weakening the underground rhizome system by cutting (or other means) and by ensuring that the area is grazed during the growing season.

Should be noted by contributors from a number of common grassland species such as ribwort's plantain, plantain, bromes and red fescue Festuca rubra which are currently only occasional sward components.

Photo 4 – The Lows dry grassland



**Condition assessment:
Sward composition – agriculturally
favoured species**

This close-up image of the sward, taken from the centre of the dry grassland field, shows not only the influence of creeping thistle on sward composition, but also other characters of the sward. The grassland is dominated by grasses – here, Yorkshire fog *Holcus lanatus*, cock's-foot *Dactylis glomerata* and rough meadow-grass *Poa trivialis* are evident. All three species are regarded as being favoured by the enhanced fertility levels of productive agriculture, and Yorkshire fog, in particular, is abundant.

The three species are all likely to remain frequent members of a more favourable sward, but a period of management is required to shift the balance towards a somewhat more diverse mixture of species. With, it is hoped, a decline in the abundance of creeping thistle and these grasses, the sward composition targets should be met by contributions from a number of common grassland species, such as ribwort plantain *Plantago lanceolata* and red fescue *Festuca rubra*, which are currently only occasional sward components.

Photo 5 – The Lows fen meadow



**Condition assessment:
Sward composition - Cover of
negative indicators - rank grasses
and sedges**

This image is taken of the field nearest the Little Ouse river. In common with areas of the other fen meadow fields, large grasses and sedge have overwhelmed the fen meadow beneath the partly lodged canopy. In areas, the fen meadow vegetation is no longer evident, and the extent of the target feature has been reduced. This is effected by the dense shade and heavy litter produced by these bulky species (see Photo 6).

In line with targets set for the habitat composition of these fields, areas to be restored to fen meadow, or areas of fen meadow to be brought into favourable conditions, should be cut and raked free of litter. This operation should be followed by grazing, or at least by annual defoliation.

Photo 6 – The Lows fen meadow



**Condition assessment:
Sward structure – litter**

This image illustrates an undesirable feature of the sward found in areas throughout the fen meadow and stands of bulky grasses and sedges. Although the litter created here by topping is exposed and not as hidden beneath rushes and other canopy dominants, it serves to illustrate the common consequences of a thick litter layer. On the one hand, small plants are unable to struggle through the litter to the light, and on the other, the low light levels beneath the litter prevents germination of seeds. Furthermore, the nutrients brought up by the root systems of the larger plants that survive is deposited on the soil surface, and favours those species listed in Attribute LFF, the agriculturally favoured species.

It is important when defoliation is undertaken that litter is not allowed to form thick mats, and preferably is removed.