

Natural England Ecological Report of Evidence and Advice to the Environment Agency for Ant Broad and Marshes SSSI (May 2013)

Aims of the report

The Environment Agency (EA) are undertaking an appropriate assessment on two licences AN/034/0009/008 and AN/034/0009/009 on Ant Broad and Marshes SSSI part of the Broadland SPA/Ramsar and The Broad SAC.

The EA have asked (e-mails of 10th April and at meeting of 18th April) Natural England a number of questions to help in the development of their appropriate assessment.

This report collates those questions and our responses, evidence base and new data. It does not contain information from a recent visit by NE to Unit 11 on May 16 2013. We will provide this in our final report on June 7th.

Questions Relating to the Location of Assessment Cells

1) Could Natural England confirm that the map of the SAC features agreed during the RoC and included in the SOP (Fig. 3.16b) represents our best understanding of the occurrence and spatial extent of the SAC features, and can they be used as a basis for locating Assessment Cells?

1.1 The map in annex 1 updates the distribution of SAC features (vegetation communities) which were presented in the RoC maps.

1.2 This is our best understanding of the occurrence and spatial extent of features based on recent survey and mapping by Parmenter 1991-4 and 1995 and Rick Southwood as part of the ELP 2007-9 surveys. The HSI (2002) report, however, mentions additional locations for vegetation types that fall within the definition of the relevant Annex 1 habitats. In particular, it highlights examples of transition mire and quaking bog type vegetation in several places not on the RoC map. It is believed this is based on Giller and Wheeler's work of 1978 *et seq.* and the 1978 survey report is being sought and we will provide this to you by 7th June. We recommend that there is a comparison of locations of key SAC features identified by each source to inform final decisions about their occurrence and spatial extent. Natural England will undertake this comparison and will provide the results by mid June

1.3 Whilst the distribution of SAC features as shown on the map (checked as recommended in 1.2) may be used as a basis for locating assessment cells there are risks which we wish to highlight to EA:

(i). The use of 'SAC features' as separate entities is not wholly reflective of reality as the vegetation types that make up the various features occur in complex mosaics with one another and 'non-SAC' vegetation, and transitions between them are common.

(ii) Ecological and hydrological processes work at a whole variety of scales and it may be that some processes affect the entire fen and all features within it, whereas others, such as groundwater inputs may be more localised. Understanding of the groundwater influence on Catfield Fen is not sufficiently advanced to identify those parts of the site or those features that may be particularly sensitive to changes in the character of groundwater inputs.

(iii). Natural England have two large data sets (from the Parmenter data and the Fen Ecological Survey), however it is not really possible to compare one with another due to different sample sites being chosen and different methodologies adopted.

(iv) There are uncertainties in the Parmenter data both in terms of community attribution to NVC community and spatial distribution (as quadrat locations where not captured by GPS and therefore the exact locations are unknown).

1.3. We advise the EA that the map can be used as a basis for locating Assessment Cells but given the above points

- There should be cross reference with the Wheeler & Giller map
- the EA may wish to consider reducing risks by for example increasing the number of assessment cells used.

2) Could Natural England confirm where the Fen Orchid is found; the map appears to suggest that it is found on Great Fen in the Exterior System?

The fen orchid occurs within the Butterfly Conservation NNR part of Catfield Fen, found by the Broads Fen Survey in 2007, in a S24e quadrat at TG36968 21068. There are several hundred plants. It also still occurs in the Great Fen (outside the rond); previously this was the only known location at Catfield.

3) Could Natural England confirm that we are using the most appropriate Assessment Cells for our assessment? Should we include additional Assessment Cells?

3.1 We take the first question to refer to location and size and our response 1.3 (iii) considers location issues.

3.2 The size of assessment cells chosen may need to reflect the approximate size of the SAC vegetation communities. The site is such a complex one that all key SAC vegetation communities will occur at a scale much smaller than 200m², for example, Wheeler's *Betula-Dryopteridetum cristatae*, close to M5 in the NVC, and part of the Transition mire and quaking bog habitat, as well as some of the S24 sub-communities .

3.3 In addition Annex 1 includes plots of the Broads' fen survey data showing all the (sub) community definitions of the samples may be of help to the EA with the determination of assessment cell size

3.4 Natural England therefore advises that the EA may wish to vary assessment cell size to accommodate the variable size of communities.

Questions Relating to the Condition of the SAC and SSSI Features

4) Could Natural England be clear about: what surveys have been done and when, what the scope of the surveys was. What results and conclusions can be drawn from the surveys?

4.1 Natural England's response to this question is in two parts, evidence and results and conclusions from the evidence. It draws on surveys and NE condition reports.

4.2 Annex 2 provides a list of surveys, dates and scope. Annex 3 provides NE condition assessments for units 3, 11 and 35 from 1998 onwards.

4.3 Results and conclusions from the evidence

(i) NE results and conclusions from this evidence should be considered in the context of limitations of survey data as a consequence of differing methodologies used; different location of quadrats. There are also limitations when comparing survey information with information gathered from NE condition assessments.

(ii) Natural England have visited the site (unit 11) and recorded data on two occasions, in 2009 and 2012. Sixteen quadrats were recorded in 2009, most of these were recorded in S24 (a sub-set of these are *Cladium* fen SAC feature), six in M24-M25 (*Molinia* meadow SAC feature) and only one in S27 (Transition mire and quaking bog SAC feature). All quadrats technically met condition targets and thresholds. There was no estimation of extent of features (one of the condition assessment criteria). In 2012 the Improving Statutory Advice and Regulation (ISAR) survey involved a 'Rapid Condition Assessment' of unit 11 based on a walk over survey of the vegetation in individual fen compartments in the unit. All attributes passed the thresholds for the relevant NVC communities. As in 2009, there was no estimation of feature extent, so it is not possible to comment objectively on maintenance of extent of SAC features.

(iii) These findings suggest that the condition of the fen is currently broadly acceptable on the basis that there is no evidence of gross change and loss of vegetation communities, including the SAC vegetation features. The evidence for maintenance of the extent of features is however lacking, and the report from the walk over survey November 2011 (that the most species-rich features are retreating to the lowest and wettest parts of the site may be an indication that undesirable change is occurring. However, there is no quadrat or species data provided to substantiate this statement.

(iv) Whilst the above is at odds with ENSIS conclusions of "unfavourable no change" this is because the local decision was made to reflect the recognised need under "remedies" for actions to continue under Restoring Sustainable Abstraction and AMP Investigations.

(v) A number of other changes have been observed in the fen that does not appear to have been detected through formal monitoring or quadrat data provided. It should be noted here that NE's condition assessment is not designed to detect fine-scale, subtle changes in vegetation, particularly in the complex mosaics of tall herbaceous wetland vegetation found at Catfield. These changes are as follows:

- An increase in woody species
- A decrease in the cover of *Sphagnum* and drying of *Sphagnum* areas
- A decrease in abundance of species of wet habitats
- Reduction in stature of reed in reedbed areas

(vi) With the exception of the increase in woody species, for which limited data are available (refer 5.2), the other changes are based on more subjective visual assessments of the fen and are not supported by quantitative data.

(vii) There are several possible reasons for these changes, most of them associated with wetland successional processes and consequent drying of the fen surface. Various authors (e.g. HSI (2002), ELP (2010)) have described the long-term ongoing processes of succession in the Broads fens, including:

- terrestrialsation of turf ponds as organic material accumulates, leading to loss of wet fen communities to dryer fen types;

- accumulation of litter and root material on solid uncut peat leading to a raised peat surface and greater distance from groundwater, drying, species-change and development of scrub and trees;
- the development of a tussock structure in unmown fens allowing species change and the development of trees and scrub;
- the development of *Sphagnum* surfaces above the groundwater table, leading to further acidification at the surface of the fen. The long-term sustainability of these features is dependent on their continued buoyancy;
- base-depletion, as the fens no longer experience river flooding with basic water, and may be some distance from lateral water flow from ditches. The effect of this is to acidify the fen surface with potential loss of species and decline in vigour of reed.

(viii) These processes can be slowed, but not wholly arrested, by fen management, i.e. cutting, grazing, scrub and tree removal, and excavation of new turf ponds. Cessation or reduction of intensity of management will allow succession to occur more rapidly. Hydrological changes, such as increased drainage and groundwater abstraction, are also likely to accelerate the rate of succession and drying of the fen surface.

(ix) A series of dry years, as has been experienced over the last 6-7 years can also result in indications of drying in fens, with those species of less wet conditions benefiting at the expense of the more desirable wet fen species, such as *Sphagna*. The long-term impact of this is dependent on various factors, including the severity and duration of the dry period, as well as the addition of external pressures such as groundwater abstraction.

(x) It is possible that the reported drying and decrease of *Sphagnum* cover in Middle Marsh (2011) is attributable to succession, however, the water supply mechanisms to this area are not fully understood and there may be a groundwater connection via dykes and through the fen – clay – Crag interface. S27 was reported in 2002 as being well-developed around Middle Marsh Duck Decoy. This pool has been dug down the Crag, so potentially receives groundwater inputs. If this is the case, groundwater abstraction may potentially affect levels and water chemistry here. Further work is required to establish the significance of groundwater to this part of the site and others, particularly those close to the upland edge.

(xi) Overall, recent survey work both formal and informal, suggests a site that at a coarse scale is largely unchanged with few if any species lost and largely the same vegetation communities present. At a more subtle scale the reported changes suggest a pattern not inconsistent with Broads-wide change in fens reported in ELP (2010), of coarsening of vegetation, loss in extent of the wettest fens and increases in scrub and woodland at the expense of high quality fen. The lack of data on extent of high value features, however, makes an objective assessment difficult, as does the lack of understanding of ecohydrology in the internal system of Catfield Fen when considering causes of change beyond those expected as a result of successional processes. Clearly though the indications of change that have been observed in this important site are concerning, and in the interests of long-term sustainability of the site need to be investigated thoroughly and their causes firmly established.

(xii) NE visited Catfield Fen Unit 11 on May 16 and has yet to fully reflect on what was seen. We will reflect observations from that visit against the above in the June report. It is worth noting that there was change and the reasons for such change are still applicable; but the nature and extent of change is different to that reported by surveys and reports.

- 5) Could Natural England confirm whether the quadrats were the same between the early 1990s and 2009 surveys, and whether the increase in woody species is associated with the SAC features?

As with Question 1 the map in annex 1 shows where the two surveys occurred.

5.1 Natural England confirms that the quadrats are not exactly the same between the 1990s and 2009 survey.

5.2 We confirm that this data shows that woody species have increased in the quadrats that are associated with S24; however the changes have not been significant enough to trigger a change to unfavourable condition. Common Standards Monitoring requires the % cover of trees/ scrub in the open fen should be less than 10% over the whole unit, both surveys have indicated less than 10% cover.

- 6) If the condition of any SAC features is not acceptable, could Natural England be specific about where the SAC features are not in an acceptable condition and why?

6.1 "Acceptability" of the condition of SAC features is made in reference to conservation Objectives and definitions of favourable condition for designated features of interest. These tables have already been provided to EA and have not been updated to a final version. They are included in this report for completeness.



**Ant B &
consultation draft**

6.2 Annex 3 provides NE condition assessments for units 3, 11 and 35 from 1998 onwards. Annex 4 provides detail on the individual SAC and SSSI features condition assessments

6.3 In unit 11 the SAC features that are recorded as not in an acceptable condition, though meet condition targets and thresholds are:

H7140 - transition mires and quaking bogs

H7210 - calcareous fens with *Cladium mariscus* + species of *Caricion davallianae*

In Unit 3 the SAC features that are not in an acceptable condition though meet condition targets and thresholds are:

H7140 - transition mires and quaking bogs

H7210 - calcareous fens with *C. mariscus* + species of *Caricion davallianae*

S1903. *Liparis loeselii*; Fen orchid

Note: In terms of Common Standards Monitoring, the units may meet the criteria in the Favourable Condition Tables but as a result of concerns over changes in the vegetation and the potential link with abstraction that lead the units to being marked as unfavourable.

6.4 We consider there is likely to be sufficient habitat of appropriate quality for *Vertigo moulinsiana* and judge this feature to be currently meeting condition. A re-survey will need to be considered in the near future.

6.5 Annex 5 summarises NE assessment of evidence indicating change, possible reasons for change and of the significance of the change where this is considered to be long term.

7) Could Natural England therefore confirm what appears to be apparent from the Doarks report that the condition of SAC/SSSI features is acceptable

7.1 The “Compendium of ecological and eco-hydrological evidence from Catfield Fen Norfolk 31st January 2011” did not state that the condition of the SAC features were acceptable.

7.2 Section 3.3 of the report it states “There is no evidence of major shifts in NVC community within Catfield Fen to suggest that irreversible damage has occurred. We cannot, however, conclude that damaging shifts in the vegetation quality are not occurring on account of the lag time between adverse environmental conditions and its manifestation in NVC communities present on site”

7.3 The report goes on to conclude that there is evidence of increased woody species, a significant reduction in the stature of the reed, scrubbing up of large parts of the fen, changes in the moss community and a number of sensitive plant populations in decline. However, whilst surveys and reports indicate that there has been change, the nature, extent and significance should be considered in the context of difficulties in comparing data derived from different surveys and discerning anecdotal comment from evidence. In addition, NE is not clear of the basis of some of the changes listed eg data relating to reduction in reed vigour and declines in sensitive plant populations. Furthermore, changes listed may be caused by a different factors which are difficult to entangle eg reference to reduction in reed stature may result from changes in cutting regime

7.4 Natural England’s view on the acceptability of the SAC/SSSI features are detailed in Section 4.3 and 6.3

Questions relating to the RoC Stage 4 Methodology

8) Are Natural England still in agreement that the RoC Stage 4 methodology is appropriate for defining acceptable levels of hydrological impact, and acceptable levels of abstraction in the vicinity of a Groundwater Dependent Terrestrial Ecosystem (GWDTE)?

8.1 Natural England still agrees that the ROC stage 4 methodology as outlined in “Anglian Region Habitats Directive Review of Consents stage 4 summary note technical approach, criteria and thresholds applied for inland sites including North Norfolk Coast Ursula Buss January 2009” is appropriate for defining acceptable levels of hydrological impact, and acceptable levels of abstraction in the vicinity of a Groundwater Dependent Terrestrial Ecosystem (GWDTE)

8.2 It is important to note that in the assessment of abstraction on the Ant Broads and Marshes SSSI there are no acceptable historical abstractions and therefore the assessment uses naturalised conditions as the baseline.

8.3 Note: advice in response to question 8 has been provided verbally by Anna Wetherell and will need to be reviewed on her return after 22nd May.

9) Are Natural England still in agreement that the Decision Table, or ‘Risk Matrix’ which forms part of the RoC Stage 4 methodology can be used to inform the acceptable level of abstraction within the vicinity of a GWDTE?

9.1 Natural England are awaiting a more detailed explanation from the EA of the meanings of the Risk Matrix criteria and to see further explanation on weighting before responding to this question.

References

Broads Authority, Natural England, (2010) Fen Plant Communities of Broadland

Broads Authority, Natural England, (2010) Broads Fen Invertebrate Survey

Broads Authority, Natural England, (2013) Broads Fen Condition Assessments

Broads Authority, (2013) Broadland Fens Site Hydrology Assessment and WETMEC Development

A. Bull (2005-2010) Alec Bull report and letters

Doarks and Dawkins (2011) NE Monitoring

C. Doarks (2011) Historic photographic evidence, A compendium of ecological and eco-hydrological evidence

ELP (2007-9) Fen Plant Communities of Broadland

Giller (1978) Vegetation description of Catfield and Irsted Fen NCC unpublished NCC Norwich,

Parmenter (1991-4) Broads Fen Resource Survey

Parmenter (1995) Broads Fen Resource Survey

University of Sheffield, (2002) Catfield Hydrological survey HSI Ltd & Wetland Research Group,

Annex 1

A map showing the distribution of SAC features (vegetation communities) and their spatial extent based on recent survey and mapping by Parmenter 1991-4 and 1995 and Rick Southwood as part of the ELP 2007-9 surveys.



Catfield_fen
features map_29.4.

The attached a plot of the Broads' fen survey data showing all the (sub)community definitions of the samples will help with the determination of assessment cell size



Catfield_unit
_NVC subcomms_1L



Catfield_unit
NVC subcomms

Annex 2 Surveys, dates and scope

Survey and date	Scope	Comment
Broadland Fen Resource Survey 1991-94 – J Parmenter (English Nature, Broads Authority, 1995)	<ul style="list-style-type: none"> • First Broads-wide survey of fen vegetation • Large database of quadrat data, mapped • Historical and contemporary site descriptions of vegetation 	<ul style="list-style-type: none"> • Plant community descriptions – limited use due to the development of a non-NVC community structure which has not been subsequently adopted
Broads SAC Wet woodland survey (1997)	<ul style="list-style-type: none"> • survey of wet woodland in N2K sites (wet woodland only); 	
Southwood (condition assessment 2009)		
Dawkins and Doarks walk over survey (2011)	<ul style="list-style-type: none"> • walkover survey that recorded key aspects/ changes in the vegetation and plotted these on a map. 	Non standard condition assessment method
Broads Fen Ecological Survey – comprising: <ul style="list-style-type: none"> *Fen Plant Communities of Broadland (Broads Authority, Natural England, 2010) and *Broads Fen Invertebrate Survey (Broads Authority, Natural England, 2010) 	<p>Broads-wide survey of fen vegetation – comparisons not made with 1995 survey due to methodology problems</p> <ul style="list-style-type: none"> • Large database of quadrat data, mapped • Description and discussion of NVC communities, and locally-identified communities • Discussion of changes and other issues requiring further research <p>2. Survey of a range of</p>	<p>Responses to management not well-covered due to lack of good management data</p> <p>Did not include survey of Unit 11 as permission withheld</p>

	<p>invertebrate groups, four reports:</p> <ol style="list-style-type: none"> 1. Responses to local factors –hydrology, vegetation management 2. Responses to salinity 3. Responses to climate change 4. Evaluation of invertebrate assemblages using ISIS (with vol 1) 	
HLS site visit Dave Weaver (2012)	An Integrated Site Assessment	This is condition assessment standard methodology combined with assessment as to whether HLS prescriptions are being met (indicators of success)
Broads Fen Condition Assessments (Broads Authority, Natural England, 2013)	<p>Five volumes, by river valley, using the results of the 2010 fen vegetation surveys</p> <ul style="list-style-type: none"> • Overview of fen habitats within each valley • Detailed site accounts, with brief management comments and suggestions 	NB This is not SSSI condition assessment following NE methodology Report uses fen survey data from report above and so does not include new data .
*Broadland Fens Site Hydrology Assessment and WETMEC Development (Broads Authority, 2013)	<ul style="list-style-type: none"> • Assessment of available hydrological data • Production of trial WetMecs for three Broads sites for Catfield and Irstead Fens 	No further survey work completed

Starred documents * are available at <http://www.broads-authority.gov.uk/authority/publications/conservation-publications.html>

Annex 3

The spreadsheet below provides a summary of all recorded condition assessments on ENSIS for units 3 and 11 and 35.



**Catfield_unit
condition assess...**

The 2011 visit by Sarah Dawkins and Clive Doarks was a walkover survey that recorded key aspects/ changes in the vegetation and plotted these on a map. The notes on the map were summarised in the ENSIS record relating to that visit.

Dave Weaver visited in 2012 for an HLS only Integrated Site Assessment. The results were provided to EA on the 7th December 2012 but are included below for completeness.



ISA form

0179731 HQ3



ISA form

201.0179731 HQ6(1)



ISA form

20179731 HQ6(2)



ISA form

20179731 HQ6(3)



ISA form

20179731 HQ7 201

Annex 4

The Table below is from ENSIS and shows the condition of each feature on Unit 3 and 11. Unit 35 is not included as it is a standing open water habitat.

Unit 3

FEATURE	CONDITION	SAC/SSSI	DATE
H3150 - natural eutrophic lakes with magnopotamion or hydrocharition	FAVOURABLE	SAC	17 Jun 2011
H7210 - calcareous fens with c. mariscus + species of c. davallianae	UNFAVOURABLE NO CHANGE	SAC	17 Jun 2011
H91E0 - alluvial woods with a. glutinosa, f. excelsior	FAVOURABLE	SAC	17 Jun 2011
S1016 - vertigo moulinsiana, snail	FAVOURABLE	SAC	17 Jun 2011
S1355 - otter, lutra lutra	FAVOURABLE	SAC	17 Jun 2011
H7140. Transition mires and quaking bogs;	UNFAVOURABLE NO CHANGE	SAC	
S1903. <i>Liparis loeselii</i> ; Fen orchid	UNFAVOURABLE NO CHANGE	SAC	
Floodplain fen (lowland)	UNFAVOURABLE NO CHANGE	SSSI	17 Jun 2011
Assemblages of breeding birds - lowland open waters and their margins	FAVOURABLE	SSSI	17 Jun 2011
Ponds	FAVOURABLE	SSSI	17 Jun 2011
Vascular Plant Assemblage	UNFAVOURABLE NO CHANGE	SSSI	17 Jun 2011
Wet Woodland	FAVOURABLE	SSSI	17 Jun 2011
Ditches	FAVOURABLE	SSSI	17 Jun 2011
Invertebrate Assemblage - mineral marsh and open water: open water	FAVOURABLE	SSSI	17 Jun

on disturbed sediments			2011
Invertebrate Assemblage - permanent wet mire: mesotrophic fen	FAVOURABLE	SSSI	17 Jun 2011
Invertebrate Assemblage - permanent wet mire: rich fen	FAVOURABLE	SSSI	17 Jun 2011

Unit 11

FEATURE	CONDITION	SAC/SSSI	DATE
H3150 - natural eutrophic lakes with magnopotamion or hydrocharition	UNFAVOURABLE RECOVERING	SAC	17 Jun 2011
H7140 - transition mires and quaking bogs	UNFAVOURABLE NO CHANGE	SAC	17 Jun 2011
H7210 - calcareous fens with c. mariscus + species of c. davallianae	UNFAVOURABLE NO CHANGE	SAC	17 Jun 2011
H91E0 - alluvial woods with a. glutinosa, f. excelsior	FAVOURABLE	SAC	17 Jun 2011
S1016 - vertigo moulinsiana, snail	FAVOURABLE	SAC	17 Jun 2011
S1355 - otter, lutra lutra	FAVOURABLE	SAC	17 Jun 2011
Floodplain fen (lowland)	UNFAVOURABLE NO CHANGE	SSSI	17 Jun 2011
Lowland Mire Grassland And Rush Pasture	UNFAVOURABLE NO CHANGE	SSSI	17 Jun 2011
Assemblages of breeding birds - lowland open waters and their margins	FAVOURABLE	SSSI	17 Jun 2011
Ponds	FAVOURABLE	SSSI	17 Jun 2011
Vascular Plant Assemblage	UNFAVOURABLE NO CHANGE	SSSI	17 Jun 2011
Wet Woodland	FAVOURABLE	SSSI	17 Jun

			2011
Ditches	FAVOURABLE	SSSI	17 Jun 2011
Invertebrate Assemblage - mineral marsh and open water: open water on disturbed sediments	FAVOURABLE	SSSI	17 Jun 2011

ANNEX 5

NE's assessment of evidence indicating change, possible reasons for change and an of the significance of the change where this is considered to be long term.



**catfieldevidence.x
lsx**