Response to Reviews

Response: Many thanks for the thorough and constructive comments regarding our manuscript which we have endeavoured to address as follows:

1) comments from Referees, (2) author's response, (3) author's changes in manuscript.

Response to Referee #1

(1) This particular data set offers some interesting challenges. I quite agree that this systematic and sustained UK field mapping activity has produced data "globally unique in their geographical coverage and time span". When one looks at the impressive range of other similarly-mapped data from the UK published in ESSD, one gets a strong impression of a very positive overall UK data gathering and sharing effort. I strongly recommend eventual publication of this particular data set as a prominent component of that overall UK effort, but I worry a bit about the actual user-level quality of this data set and also about the 'beyond' in the title. The authors use much of the manuscript text to justify the large scale CS sampling scheme. This reviewer appreciates those descriptions but, having set up the fundamental basis of that sampling now almost 40 years ago based on solid geomorphological ecological classification "strata" (the so-called ITE Land Classification system which has itself evolved over the same time period), one really wants assurance of backward-forward interoperability of the classifications and terminology in order to use these data to identify and quantify change.

(2) As described in the text, any changes to the ITE Land Classification have been conservative, and are described clearly, for example in Barr and Wood (2011). Should one wish, it is still quite possible to utilise the older versions of the Land Classification in order to produce valid national estimates for each survey's features. A key point is that the Land Classification provides an objective sampling framework, independent of bias, regardless of the date of the classification. There are several examples where the success of the British Land Classification has been built upon (for example in Northern Ireland (Cooper, 2000), Spain (Elena-Rosselló, 1997), Norway (Bakkestuen et al. 2008), Sweden (Ståhl et al., 2011) and Estonia (Villoslada et al., 2016). Metzger et al. (2013) describe how the consistent classification of land into relatively homogenous strata provides such a valuable spatial framework as the basis for monitoring ecological indicators across large areas including Europe and the world.

(Other issues are addressed further down).

Bakkestuen, V., Erikstad, L., Halvorsen, R.: Step-less models for regional environmental variation in Norway. J Biogeogr 35:1906–1922. doi:10.1111/j.1365-2699.2008.01941.x, 2008

Barr, C. J., and Wood, C. M.: The Sampling Strategy for Countryside Survey (up to 2007). Revised and Updated from: 'The Sampling Strategy for Countryside Survey', C.J. Barr, September 1998. DETR CONTRACT No. CR0212, Lancaster, 2011.

Cooper, A. Land cover monitoring in Northern Ireland. In: Rushton B.S. (ed) Biodiversity: the Irish dimension. Royal Irish Academy, Dublin, pp 122–131, 2000

Elena-Rosselló, R.:Biogeoclimatic classification of the Spanish regions of Iberian Peninsula and Balearic islands. Ministry of Agriculture, Fisheries and Food, Madrid, 2007

Metzger, M. J., Brus, D. J., Bunce, R. G. H., Carey, P. D., Gonçalves, J., Honrado, J. P., Jongman, R. H. G., Trabucco, A., and Zomer, R.: Environmental stratifications as the basis for national, European and global ecological monitoring, Ecological Indicators, 33, 26-35, doi:10.1016/j.ecolind.2012.11.009, 2013.

Ståhl, G., Allard, A., Esseen, P.-A., Glimskär, A., Ringvall, A., Svensson, J., Sundquist, S., Christensen, P., Torell, Å. G., and Högström, M.: National Inventory of Landscapes in Sweden (NILS)—scope, design, and experiences from establishing a multiscale biodiversity monitoring system, Environmental monitoring and assessment, 173, 579-595, doi:10.1007/s10661-010-1406-7, 2011.

Villoslada, M., Bunce, R. G. H., Sepp, K., Jongman, R. H. G., Metzger, M. J., Kull, T., Raet, J., Kuusemets, V., Kull, A., and Leito, A.: A framework for habitat monitoring and climate change modelling: construction and validation of the Environmental Stratification of Estonia, Regional Environmental Change, 17, 1-15, DOI: 10.1007/s10113-016-1002-7, 2016.

(3) These issues are discussed in more detail in the companion paper, Wood et al. (2017), hence we did not want to repeat the same information again. However, we will insert text into section 2 to emphasise the points above.

Wood, C. M., Smart, S. M., Bunce, R. G. H., Norton, L. R., Maskell, L. C., Howard, D. C., Scott, W. A. and Henrys, P. A. 'Long-term vegetation monitoring in Great Britain – the Countryside Survey 1978–2007 and beyond', Earth Syst. Sci. Data, 9(2), 445-459,2017

(1) Fundamentally, if we accept - as this reviewer does - that we have a stati[sti]cally-valid spatial survey, can we then assure ourselves of consistency of the classification schemes and terminology across and among 5 different mapping episodes covering 40 years and 32 land categories? In particular we read about a substantial discontinuity between 1990 and 1998 that necessitated development of a translation protocol "to ensure that past data would remain valuable for investigating change". This homogeneity or inhomogeneity seems to me the fundamental quality issue of the data set, one not quite addressed head-on by the presentation.

(2) The advantage of the way Countryside Survey information is recorded, is that codes are recorded in as disaggregated a way as possible, which makes the data flexible when requiring translation into different reporting categories. The 'substantial discontinuity between 1990 and 1998' refers to the ability to report change (affecting the area features only) by JNCC Broad Habitats (Jackson, 2000). These Broad Habitat definitions were new in 1998, therefore it would never have been possible to record these categories in surveys prior to this. Despite this, it is possible to translate the recorded codes into the Broad Habitat categories. This is not a fundamental discontinuity in the recorded data. Another example of the flexibility of field codes in translating to other categories is described in Bunce et al. (2013), regarding European Annex 1 categories.

We have stated in section 3.1 that although translating the data to Broad Habitats has not been straightforward, inconsistencies have been minimised by careful checking of the data. By checking the field handbooks, supplied as supporting information (see below), users can see what was recorded in each survey, and make their own judgement about whether they can assess change in the particular feature of interest. It would be fair to say that it would be impossible to retain absolute continuity due to improvements and developments over time. However, very clear field guidelines, data checking and quality control in the field minimise any issues.

Bunce, R. G. H., Bogers, M. M. B., Evans, D., and Jongman, R. H. G.: Field identification of habitats directive Annex I habitats as a major European biodiversity indicator, Ecological Indicators, 33, 105-110, https://doi.org/10.1016/j.ecolind.2012.10.004, 2013.

Jackson, D.: Guidance on the Interpretation of the Biodiversity Broad Habitat Classification (Terrestrial and Freshwater Types): Definitions and the Relationship with Other Habitat Classifications (JNCC Report, No 307), JNCC, Published online, http://jncc.defra.gov.uk/page-2433, 73pp, 2000.

(1) Like many anticipated users, this reviewer has not and likely will not read all the Barr or Wood references (more than 30 total by quick count) cited in this paper; I believe we want to provide confidence to future users of these data without requiring them to read a separate volume of literature?

(2) The issue of metadata availability is addressed further down. We would like to point out here that the majority of the Barr et al., references are the dataset citations, thus no reading required.

(1) In my close look at a small subset of these data, I encountered uncertainty about temporal consistency of sampling among squares and about theme and attribute terminology. If I discovered these issues, other users will also encounter them. The authors need to provide slightly more, or more-explicit, assurances.

(2) Addressed individually below.

(2) The following set of criticisms relate to the policies of the data repository, the NERC Environmental Information Data Centre (EIDC). As a data depositors, we have no control over the Data Centre's policies (other than offering suggestions for improvement), and thus any criticism should be levelled at the Data Centre, and not at depositors personally. We have endeavoured to address the issues further under each comment.

(1) Extracting Cambridgeshire data from within 8 linear feature files proved possible (good) but cumbersome (bad). The .csv file formats open easily in R (also Excel or Numbers) but extraction of subsets by geographical or parameter criteria proved very time consuming. Based on this experience, I suggest three modifications:

1. Could we get a readme.txt file in each zip folder to explain the ATT and features files? Otherwise we expect a user to go back to one of the citations of the manuscript to find the explanations of file formats and column definitions? One standard readme file would probably fit all the linear features folders?

(2) A range of supporting information is supplied with each dataset, accessible from the DOI landing page. Data files and metadata files deposited with EIDC are stored and provided separately. The DOI for each dataset links to a landing page, from which the links to both the data download and document download are displayed clearly in the 'Get the data' panel on the right-hand side.

EIDC will not accept or publish any dataset without adequate supporting information as described: http://eidc.ceh.ac.uk/deposit/supportingDocumentation

(1) 2. Users will have a much more successful and positive experience with these data if they can access them in database format. As I worked in R it often occurred to me to use R to write my extracted data into a separate database and then perform my explorations and analyses from that self-prepared database. If I intended to spend more time with these data, for example to look at the land coverage files or other geographic regions, I might have justified the time and effort involved in creating such a database. But one really does not want each of us creating our own separate databases? Evidently the master data files exist in an Oracle geodatabase. Could we not get, at least as an option, an open-access version of that geodatabase? Perhaps in mySQL or PostgreSQL? (Because of the absence in this case of spatial coordinates, perhaps mySQL works better?) Or perhaps - and I understand the technical and political barriers to this solution - an on-line database searchable by parameter, time slice, square and county, to allow users to subset and download data of specific interest?

(2) Again, this is a policy of the data repository (http://eidc.ceh.ac.uk/support/preparingForDeposit). Data depositors are encouraged to deposit data in as non-proprietary format as possible, hence the csv files. The guidance states: 'Comma separated value (.csv) files are the preferred format for depositing your datasets as they are proven to be sufficiently robust and future-proof, allowing reading and viewing of the data through a wide variety of common software tools and conversion to many common formats. This file type has been used since the 1970's and is possibly the most widely used standard for datasets in such circumstances. In short, saving your datasets as .csv file may take a few extra minutes but it becomes far more valuable for re-use and if publishing your data in the public domain.'

Yes, it would be a good idea to have a facility for users to subset and download data – the current EIDC catalogue does not currently allow this, but this is likely to be something the data centre might want to develop in the future. At present the files are delivered as static 'csv' files. However, future developments and upgrades to the EIDC catalogue will allow direct access to most files via scripts using (for example) R and Python.

(1) 3. File access through CEH proved easy, reliable and fast. But I already have a CEH login profile; many future users will not. In actual fact the registration and request sequences violate the open access spirit and practice of ESSD? I understand the national UK requirements on CEH that impose such restrictions, but one wonders how much additional usage we would see of this whole sequence of UK terrestrial data files if we could move them into fully open access. BODC and the Antarctic Data Centre at BAS seem to face similar issues but to achieve some success at fully open one-click access?

(2) The NERC Environmental Information Data Centre (EIDC) is an acceptable repository to ESSD, currently fulfilling the repository criteria as stipulated by the journal (https://www.earth-system-science-data.net/for_authors/repository_criteria.html):

- *Persistent identifier: The data sets have to have a digital object identifier (DOI).*
- *Open access: The data sets have to be available free of charge and without any barriers except a usual registration to get a login free-of-charge.*
- *Liberal copyright: Anyone must be free to copy, distribute, transmit, and adapt the data sets as long as he/she gives credit to the original authors (equivalent to the Creative Commons Attribution License).*
- *Long-term availability: The repository has to meet the highest standards to guarantee long-term availability of the data sets and permanent access.*

(1) On page 8 in Section 5 we read about quality assurance steps: "Quality Assurance (QA) exercises were undertaken during the 1990, 1998 and 2007 surveys, which involved a second team of surveyors (QA assessors) repeating the survey for all or part of a square." Good, if mapping errors represent the largest source of uncertainty. But classification and terminology errors also arise? If, as the authors claim, these data "can be converted into national estimates, with associated error terms", then we need in this manuscript a more complete error assessment?

(2) To the best of our knowledge, Countryside Survey has the most comprehensive Quality Assurance and Quality Control procedures of any dataset of its type. The CS QA includes both an assessment of the accuracy of the mapping and the accuracy of the classification of features (i.e. is the feature in the right place, and is it what the surveyor says it is). The objective sampling strategy ensures repeatability in a way that subjective methods do not allow (such as mapping by National Vegetation Classification) for example as described in Hearn et al., 2011.

With regard to statistical error terms, these are fully presented within the national estimate datasets cited in the paper, in section 7.1.

Hearn, S. M., Healey, J. R., McDonald, M. A., Turner, A. J., Wong, J. L. G., and Stewart, G. B.: The repeatability of vegetation classification and mapping, Journal of Environmental Management, 92, 1174-1184, https://doi.org/10.1016/j.jenvman.2010.11.021, 2011.

(3) We will amend the manuscript to clarify the availability of the upper and lower limits for the national estimates provided in each national estimate file.

(1) My analysis of the Cambridgeshire data suggest several additional sources of uncertainty:

1. Specific squares, no matter how rigorously selected, may not receive repeat attention at each survey period. In their recitation of growing numbers of squares in each subsequent survey (e.g. page 2 line 14 and Figure 1), the authors allow an impression of very consistent repeatable surveys. Later, e.g. lines 11 to 13 on page 10, we do learn of the issue of "squares that had been surveyed in both of the years in question". Perhaps one of the cited references includes a complete square-by-square time history, but we need it in this paper to better understand sampling uncertainties? For Cambridgeshire linear features I found the following: This extract suggests that of 8 squares identified in the region, the database includes only 5 (less than 65%!) for which we have actual data? (I suspect consistent sampling of 6 squares, e.g. more like 75%, but because the 1998 linear features .csv file truncates at SQUARE UEZICR, I can't confirm full data access for 1998). 65% to 75% repeat sampling? If the same pattern persists for other regions and other parameters then the apparent growth in number of squares sampled over time as referenced above hides a substantial mapping episode to mapping episode variability? The authors should explicitly address this issue of sampling consistency. (And they should check how many of the .csv files might have erroneous truncation?) What factors contribute to these episode to episode differences? Access, land use change, inundation?

(2) As stated in section 5, regional estimates below the level of Land Class are not recommended, hence it is not relevant which specific squares were surveyed in each survey at a county level. As each square is a statistical sample, the salient point is whether enough squares in each statistical unit (Land Class) have been surveyed in each year in order to create valid Land Class and national estimates of features. This is described in Section 2, and also described in more detail in Barr & Wood (2011) which contains a detailed breakdown of squares surveyed in each Land Class, in each survey (again supplied as supporting information). As described in Section 7.1, new statistical models can take into account data from all squares, regardless of whether they are repeated in each survey or not.

As stated in the introduction, there has been an increase in surveyed squares each year – this is consistent with Cambridgeshire squares – 5 surveyed in 78, 7 in 84 and 8 in 1990 and 1998, and 7 in 2007. One square was refused access in 2007. To date, refused access to land is the only reason why a whole square might not have been re-visited in a survey. The majority of land surveyed is in private ownership, and access cannot be assumed.

After double checking the files again, we're not sure what the reviewer means by 'the 1998 linear features .csv file truncates at SQUARE UEZICR'. The file looks to be complete, including square WGFZAS, as do all other files.

Barr, C. J., and Wood, C. M.: The Sampling Strategy for Countryside Survey (up to 2007). Revised and Updated from: 'The Sampling Strategy for Countryside Survey', C.J. Barr, September 1998. DETR CONTRACT No. CR0212, Lancaster, 2011.

(3) We will clarify the point regarding the number of surveyed squares, and insert a link to Barr & Wood , 2011.

(1) Very often a user confronts common and species names intermixed. Plums, field maple, horse chestnuts, English walnut - for these and several other tree types in the Cambridgeshire records we encounter a mixture of precise and general, without apparent reason or justification. Often we find both the common name and the genus.species name in the same event. How do we interpret this? Again, do we need to consult an earlier published description? Have the quality assurance experts added a specific name while an earlier surveyor entered only a common name? Formal species names show up more often in more recent surveys. How does this apparent discontinuity and uncertainty in plant identification contribute to overall mapping uncertainty?

(2) As described in section 3. 1, some updating of codes took place over time, reflecting experience gained in the field from previous surveys. The mixing of common names and species names is due the way in which features were recorded in the field, which becomes clear once consulting the Field Survey Handbooks (supplied as supporting information). In later surveys, surveyors were offered the choice of which to record. Between years or squares, there may be variations due to different surveyors. This is not a problem for analyses, it is just necessary to ensure you select both options for the species in question. Ideally, yes, it would be better to have consistency, however the data reflects information as recorded, in order not to introduce any potential translation errors.
We have been unable to find any examples of where both the latin and common names for the same species have been used on the same event.

(1) A similar uncertainty arises from generic terminology. Again in the Cambridgeshire subset, 'other conifers' become 'mixed conifers', 'mixed hardwoods' become - perhaps - 'mixed broadleaf'. Oak and elm apparently disappear, shrubs and grassland apparently appear, either in reality or as a consequence of changing terminology. Should I have consulted one of the cited references to understand this terminology? Neither I nor subsequence potential users will want to take that additional step. Can we not get a readme file and some quality control to help us out?

(2) Again, this becomes clear once consulting the Field Survey Handbooks (supplied as supporting information) (also see comment below). It is also important to note that real change may have occurred over time.

(1) Unfortunately, linear feature attributes in the Cambridgeshire subset demonstrate similar discontinuities. " >50% Hawthorn" in 1984 never appears again in subsequent surveys. "Dead standing trees" occur in 1984 and 1990 but never in later surveys; "earth bank" only emerges in 1998 and 2007. Of 28 separate individual terms used as attributes on linear features across the four surveys in Cambridgeshire, only four terms show up consistently and identically in all four surveys. A large discontinuity apparently occurs between 1984 and 1990 for this subset, different to the 1990-1998 discontinuity mentioned by the authors.

(2) As in many long-term projects, methods evolve, and over time recording has become more detailed and comprehensive. The exact method and and code lists used in each survey are described in the relevant Field Survey Handbook for each year. Essentially, the same basic feature types have been recorded each year, in some case with increased detail in subsequent surveys. There is no major discontinuity between 1984 and 1990 in terms of basic features (i.e. Primary Attributes). The stated 'discontinuity' between 1990 and 1998 concern the area Broad Habitat categories only, as described in previous comment (not linear features or points).
The comment 'Of 28 separate individual terms used as attributes on linear features across the four surveys in Cambridgeshire, only four terms show up consistently and identically in all four surveys'

does not seem correct. Assuming the 'Primary Attribute' codes are meant here, the table below shows these Primary Attribute codes as used in the Cambridgeshire squares. As shown, all codes are either the same in different surveys or can be easily translated to previous codes. Of course consideration must be made to real changes over time, which will account for some of the mis-matches. In some cases, any assessment of change must be carried out at the level of the lowest resolution of data available, which may preclude the assessment of very specific features, however in most cases this can be carried out fairly easily, and in the case of the standard reporting categories (as published in Carey et al. (2008), there is little problem in relating the codes to each category in order to produce the statistically robust estimates, as described by Scott et al. (2008).

2007	**1998**	**1990**	**1984**
Belt of trees	Belt of trees	Belt of trees	Belt
Constructed track	Constructed track	Constructed track	Constructed track
Dead Standing Tree(s)	Dead Standing Tree(s)	Dead Standing Tree(s)	Dead standing trees
Earth bank	Earth bank	*Not recorded in Cambridgeshire squares*	*Not recorded in Cambridgeshire squares*
Fence - wire on posts	Fence - wire on posts	Fence - wire on posts	Wire (Theme – Fence)
Fence - wood only	Fence - wood only	Fence - wood only	Wood only (Theme – Fence)
Footpath (exclusive)	Footpath (exclusive)	Footpath (exclusive)	Footpath (exclusive)
Not recorded in Cambridgeshire squares – footpath has gone?	Footpath (other)	Footpath (other)	Footpath (other)
Grass strip	Grass strip	Grass strip	*Not recorded in Cambridgeshire squares*
Mortared wall	Mortared wall	Mortared wall	Other..... (Theme – Wall)
Other ditch	Other ditch	Other ditch	*Not recorded in Cambridgeshire squares*
Other ditch, Sampled	Other ditch, Sampled	Other ditch	*Other ditch*
Other fence	Other fence	Other fence	Other (Theme – Fence)
Not recorded in Cambridgeshire squares	*Not recorded in Cambridgeshire squares*	*Not recorded in Cambridgeshire squares*	Iron only (Theme – Fence)
Perennial vegetation, tall herb/grass	Perennial vegetation, tall herb/grass	*New code in 2000*	*New code in 2000*
Roadside ditch	Roadside ditch	Roadside ditch	Roadside ditch
Stream	Stream	Stream	Stream
Stream, Sampled	Stream, Sampled	Stream	Stream
Unconstructed track	Unconstructed track	Unconstructed track	Unconstructed track
WLF natural shape	WLF natural shape	WLF natural shape	>50% Hawthorn
WLF unnatural shape	WLF unnatural shape	WLF unnatural shape	>50% Other Line of trees Mixed hedge (other codes determine

			whether natural or unnatural shape WLF)
Code no longer in use for linear features	*Code no longer in use for linear features*	Canalised river (change)	*Not recorded in Cambridgeshire squares*

To address specific issues:

>50% Hawthorn was a Primary Attribute in 1984, and a Species Composition Description in 2007. Although the feature was recorded slightly differently, it is still possible to differentiate the features, and compare to later surveys (as has been done in many published reports and papers).

In the chosen subset, there is still a 'dead standing tree' in one of the squares in 2007. It would not be unusual if a dead standing tree in 1990 had fallen down by 2007. The code itself was very much still in use in 2007.

It was possible to record an 'earth bank' in 1984, again the code is in use. In Cambridgeshire in 1998 and 2007, there are only 2 recorded (3 records, but 2 are part of the same feature). We have checked both of these cases; in 1984, the areas in question appear more densely wooded than in 2007, hence the earth banks would not have been as easily visible by the 1984 and 1990 surveyors. In 1998 and 2007, the banks are likely to have been more obvious, therefore surveyors would have added them to the map. Anomalies such as this are accounted for within the error limits. Whilst it is possible to 'back-allocate' to a certain extent (as described in Section 3.1), this has only been done between consecutive surveys due to the uncertainties involved in back allocating over longer timespans. In this particular case, the earth bank was likely back-allocated to 1998 from 2007.

Carey, P. D., Wallis, S., Chamberlain, P. M., Cooper, A., Emmett, B. A., Maskell, L. C., McCann, T., Murphy, J., Norton, L. R., Reynolds, B., Scott, W. A., Simpson, I. C., Smart, S. M., and Ullyett, J. M.: Countryside Survey: UK Results from 2007, NERC/Centre for Ecology & Hydrology, Lancaster, 2008.

Scott, W. A.: Countryside Survey. Statistical Report (Countryside Survey Technical Report No. 4/07), NERC Centre for Ecology and Hydrology Lancaster, 2008

(3) We will amend the text to reiterate the issue of back-allocation for linears and points as well as lines. Aside from this, the information explaining the issues above is provided, and as the second reviewer points out, 'the paper repays careful reading as the level of detail and explanation is sufficiently clear for a good understanding'.

(1) Some terms such as 'ditch' and 'stream' often include the modifier 'sampled', to indicate a link to water quality data?

(2) Yes, this was used in the 2007 survey for surveyors to indicate which watercourse was sampled in detail as part of the survey (for example Dunbar et al., 2016). This is described in the Field Handbook for 2007. However, it would be recommended that anybody requiring information regarding freshwater from Countryside Survey would download these data separately from the EIDC Catalogue (https://catalogue.ceh.ac.uk/); this is outwith the remit of this paper.

Dunbar, M.; Murphy, J.; Clarke, R.; Davies, C.; Scarlett, P. (2016). River Habitat Survey (RHS) data 2007 [Countryside Survey]. NERC Environmental Information Data Centre. https://doi.org/10.5285/40da9509-999f-4d61-85fe-59d7b32e7ca6

(1) For some squares (e.g. ROACVK in the Cambridgeshire subset), a term such as ‘fence’ does NOT appear among the identified themes while fence attributes DO appear in the attributes list. Presumably some translation file and explanation exists somewhere, but we need it here! More important, we need to know if and how (and how much) these inhomogeneities contribute to overall uncertainty? What changes can we describe, and with what confidence, based on these data? Please note again that I have only looked at a very small subset of the full data (in part because of the daunting task of looking at large pieces) and that I have only considered qualitative information.

(2) For square ROACVK, it is correct that ‘fence’ does not appear in the square, however neither are there any ‘fence’ attributes in the attribute tables. We are not sure where this confusion has arisen, but again, it is important to consult the Supporting Information supplied with the dataset.

The key changes that can be described are outlined in Carey et al., 2008, along with levels of confidence. Beyond this, as Countryside Survey is such a comprehensive data set, there are so many different elements for which change could be investigated (for example, Maskell et al., 2013), it is not possible to state exactly which changes could be described and with what confidence; it would be up to individual users to assess the suitability of the data for their particular need. As already mentioned in Section 5, we do not advise that data are investigated below the level of Land Class, for which the statistical design is appropriate.

Carey, P. D., Wallis, S., Chamberlain, P. M., Cooper, A., Emmett, B. A., Maskell, L. C., McCann, T., Murphy, J., Norton, L. R., Reynolds, B., Scott, W. A., Simpson, I. C., Smart, S. M., and Ullyett, J. M.: Countryside Survey: UK Results from 2007, NERC/Centre for Ecology & Hydrology, Lancaster, 2008.

Maskell, L. C., Henrys, P. A., Norton, L. R., Smart, S. M. and Wood, C. M. (2013) Distribution of Ash trees (Fraxinus excelsior) in Countryside Survey data, Lancaster: NERC Centre for Ecology & Hydrology.

(1) I like very much the presentation of quantitative data for linear features as presented in Table 5 (page 11) but I must also say that after my perusal of this small extract of the data I wonder how the authors achieved the statistical reliability expressed in Table 5.

The statistical methods used to produce the national estimates presented in Table 5 are described in detail in (Scott, 2008), and as described in section 7.2, the national estimates (with associated error terms) are provided in the cited datasets.

Scott, W. A.: Countryside Survey. Statistical Report (Countryside Survey Technical Report No. 4/07), NERC Centre for Ecology and Hydrology Lancaster, 2008.

(3) We will insert text to clarify the methods used, including the reference to Scott et al, 2008.

(2) Finally, I react to the word “beyond” in the title. Technically, a data presentation includes only past data? I note that annual carbon budget as published in ESSD has regularly included a prediction of total emissions one year out (e.g. for 2017 in the 2016 report) but they clearly label that as a prediction. Here we very much hope for a subsequent mapping survey - and the timing seems right! - but mostly we get a few somewhat defensive paragraphs about why one needs ground based detailed surveys in our age of drones and multi-spectral satellites. What improvements would these authors recommend to this data? How would they implement those improvements before or during an upcoming survey. Can they offer hints about timing of the next survey. If they have succeeded to tease us with interest in this process, shouldn’t they also and then assure us of next steps?

(2) The intention with the use of the word ‘beyond’ was to convey a sense of continuity and the long-term nature of the survey; ending the title with 1978-2007 sounds quite final. We are happy to

remove the word from the title, although would prefer to keep it, in order to be consistent with the accompanying paper, Wood et al., 2017.

In an ideal world, we would not change the methodology for a subsequent survey. However, as can be imagined, cost considerations in the current climate are likely to limit the preferred size and shape of the next survey, hence the text justifying ground based surveys. In terms of the timing of the next survey, again current funding constraints mean that we have stated as much as we know in Section 9. Users can check the Countryside Survey website for the latest news (www.countrysidesurvey.org.uk).

Wood, C. M., Smart, S. M., Bunce, R. G. H., Norton, L. R., Maskell, L. C., Howard, D. C., Scott, W. A., and Henrys, P. A.: Long-term vegetation monitoring in Great Britain – the Countryside Survey 1978–2007 and beyond, Earth Syst. Sci. Data, 9, 445-459, doi:10.5194/essd-9-445-2017, 2017.

(3) We are happy to take advice from the editor as to whether to remove 'beyond' from the title or not. We will insert the link to the Countryside Survey website as a link to current updates regarding the survey.

Response to Referee #2 G. Griffiths

(1) This is a detailed and comprehensive review and description of the evolution of the Countryside Survey (CS) of Great Britain. CS has been operating for 30 years and this review is a timely reminder of the critical importance of systematic, long –term monitoring of our environment. Whilst the paper is necessarily detailed and, for readers unfamiliar with CS, some of this detail may be difficult to follow in places, the paper repays careful reading as the level of detail and explanation is sufficiently clear for a good understanding. The paper is well-written and structured with only minor errors/lack of clarity. The authors make the point that this type of long-term monitoring, with only minor modifications to the method of sampling and the techniques of field recording, ensures the comparability of results over time. The breakthrough was the ITE (now CEH) Land Classification system that provided the strata from which a stratified random sample of 1km squares was selected. The Land Classification and its evolution is described in detail with references to the way in which this has enabled robust estimates of habitat area, point and liner features with associated standard errors to be made. As such the paper is not strongly theoretical and the majority of references are associated with work conducted by the authors or others as significant users of the data. In particular, the paper provides the references (DOIs) to enable users to download and inspect the archived data. Perhaps most interesting is to have a detailed history of CS from its inception to the present, providing a useful insight into the complexity of developing and implementing a national-wide system at a time when this sort of long-term monitoring is 'out of fashion'.

(2) Many thanks for such a positive review. We will endeavour to review and revise any examples of minor errors or lack of clarity. Thanks also for highlighting the importance of systematic, long-term monitoring of our environment, which as you say is currently 'out of fashion' but in our opinion is as important and relevant as ever.