Review ESSD-2017-121, Ecological landscape elements: long-term monitoring in Great Britain, the Countryside Survey 1978-2007 and beyond.

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. Fundamentally, if we accept - as this reviewer does - that we have a statically-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.

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? 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.

I downloaded, opened and evaluated all the linear feature files with focus on the small region of Cambridgeshire. I accept the explicit caution about regional assessments "Regional estimates below the level of these Land Classes are not statistically robust" but I also note that by the quality assurance techniques (repeated surveys) described in this manuscript (Section 5 on page 8), linear features had the highest reproducibility (initial survey to subsequent quality assessor match of 99%, page 8 line 11). I can not evaluate decadal changes from personal experience but for a substantial period within a decade I traveled the linear features of Cambridgeshire by foot and cycle for transport and recreational purposes.

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) 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?

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?

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?

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:

	1984	1990	1998	2007
SQUARES	AXIHWL	AXIHWL	AXIHWL	AXIHWL
	GNVOHN	GNVOHN	GNVOHN	
	HEXMHM	HEXMHM	HEXMHM	HEXMHM
		HMPTVZ	HMPTVZ	HMPTVZ
	NYVXXI	NYVXXI	NYVXXI	NYVXXI
	RMNIDX	RMNIDX	RMNIDX	RMNIDX
	ROACVK	ROACVK	ROACVK	ROACVK
	WGFZAS	WGFZAS	data missing	WGFZAS

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) 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?

3) 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?

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

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?