Review ESSD-2017-131

This manuscript and data set represents the most recent in a sequence of Wood et al. CEH data releases. Each data set describes landscape or land cover features of the UK terrain. In some cases the data sets focus on specific vegetation features, e.g. woodlands, and in other cases on very specific regions, e.g the Shetland Islands. In this particular case the data relate to rare and specialised biogeographic features surveyed once nearly 25 years ago. Collectively this series of data sets provide a remarkable and very likely "unique contribution" to terrestrial ecology. With other data sets at similar spatial resolution (e.g. UK rainfall or streamflow, both also published in ESSD) one gets a sense of, and must admire, one of the most detailed attempts anywhere on this planet to understand the composition and function of our complex biophysical environment. Whether by intent or happenstance, UK science seems to have led the way.

I applaud the authors' intentions to make these data openly available. I understand completely the challenges of preparing and presenting any such data, especially 25-year-old data, for public viewing and use. I believe ESSD represents absolutely the appropriate journal and mechanism for sharing these data.

This report on the 'Stewardship' activity could represent a bright jewel among the series of Wood et al. CEH products. It could serve to attract researchers and land managers to the larger holdings and products of CEH. It could excite people about continuing or future survey activities?

Unfortunately, this particular package has proven very difficult to understand and review. Having also reviewed the Wood/CEH submission immediately prior to this one (ESSD-2017-121 Countryside Surveys 1978 -2007, ESSD owes me some reward for effort above and beyond?), I should have started with sufficient background and basic knowledge to understand how this piece both stands on its own and fits within a larger picture. I feel, however, that in this case the authors have packaged, released and described the data entirely and exclusively on their terms, e.g. the terms of the original Countryside Stewardship Scheme research proposal nested deeply within UK science infrastructure of that time. The fact that an outside researcher or ecosystem manager, one not familiar with UK jargon but interested either in the ecology aspects or in lessons offered about how one might (or might not!) go about replicating such surveys, might want to actually understand and use these data seems never to have occurred to these authors. They have attempted to transmit these data without, apparently, understanding or even acknowledging the needs and interests of the receivers. This reviewer felt that only after a day or two sitting down with these authors could one really understand this particular data and its potential impact. Absent that opportunity, the research community needs a much clearer, much more accessible, and much more useful presentation of and guide to these data. CEH employs science communication experts? Ask one of them to help you revise and rewrite this product with a friendlier face for a broader audience.

I start with my usual complaint about the CEH data access processes. As before, I compliment CEH as an effective and well-organised data archive! But, based on registration barriers imposed, CEH now knows my identity and which data sets I have requested and downloaded. How does that qualify as free and open access? How does the ESSD review process offer true anonymity to its reviewers in the face of such barriers?

My second observation echoes comments by several reviewers throughout this sequence: the reliance of each of these data descriptions on a large volume of Wood and Barr literature, both published and unpublished reports. Good on these authors for constructing that body of work but for those of us who will not or - again due to access barriers - can not find nor read all of that background information, each data presentation needs to explicitly provide an appropriate subset or summary of that information. In this particular case the authors clearly know much more about political and ecological landscapes of 1992 but fail to effectively transmit necessary bits of that knowledge to users. Too often we encounter a phrase that invites us to find additional information or necessary details in, e.g. Barr et al. original project report. Most of us will not find that information or detail elsewhere; we need it here.

In this particular data description the reader/user confronts the prominent and persistent issue of 'designated' versus 'non-designated', casually at first but substantially and seriously by the time

we reach results and conclusion. As used here, but as not defined until line 222, these terms represent a peculiar UK framework for identification and protection of specific landscape features and regions. Researchers from other countries will not understand these terms as the authors do, but the authors have made only minimal efforts to translate for outside users. We need to see these terms clearly defined, including analogy to like terms in use across Europe or in North America, almost as a first step of the entire narrative.

Likewise the morass of UK land survey, monitoring and assessment organisations and products. Perhaps only the authors can or should understand this full array but they need to help users at least know what they have done. I tried to construct a table as follows to help me understand the various sources these authors used to define and validate their land masks.

	Soil Survey and Land Research Centre	ITE Land Classification 1990	1:625 000 British Geological Survey	Land Cover Map 1990	Other?	Comparisons
Lowland heath	Yes (but not listed in Table 1)	Yes			Compared to Countryside Survey	Land Cover Map 1990, English Nature database
Calcareous grassland			Yes		Exclusions based on geology?	English Nature database
Coastal		Yes (according to Table 1)		Yes (same as column C?)	Exclusion of urban regions?	none
Upland		Yes				none

Unfortunately, we never get a definition of the ITE acronym (I know it as Institute of Terrestrial Ecology, the previous appellation for CEH, but most users will not pick out that connection). I suspect, but have no way to confirm, that ITE Land Classification 1990 and Land Cover Map 1990 represent similar products? Or perhaps not, with one a geological map and the other compiled from satellite data? We need better information about these source data, as well as information about base spatial resolution of these products. All at 1km or have the authors performed interpolations? The information in the table above, extracted by me directly from text, does not match what the authors present in their Table 1? Or I have missed something?

The manuscript offers to readers a completely confusing array of terms and terminology. We read about habitats, sites and squares. We find X plots, X-plots (evidently distinct from the former but not used consistently), Y plots, S/W linear features, 25 element squares, 16-element squares, land use and land cover codes, boundary codes, key habitat types from other surveys, priority habitat types from this survey, lists of pre-defined boundary features e.g. in Table 5 (which do not match those from the Countryside Survey), habitat indicator species e.g. in Table 6 apparently unique to this survey, and more. I hope the authors forgive this reviewer for wondering whether they have deliberately attempted to hide useful or pertinent features of their data under a cloud of codes and keywords?

I understand that the authors must balance between terms used in their contracts and notebooks of 25 years ago and modern precise ecological meanings of, for prime example, habitats. (I note that a reviewer of one of the earlier data sets raised the same issue.) Strictly, a habitat attaches to a plant or animal, not to a geographic feature. A reader encounters the term 'site' or 'sites' very frequently, but not always with a certain or clear meaning. A site equals the geographic location of a square or squares? Yes. A site represents a sub-sample protocol within a square? Yes, occasionally. In some cases a site includes or coincides with a priority habitat. How does the reader keep up with these various interpretations? The authors should help all of us by declaring their terms up front.

Lowland heath and calcareous grassland regions had 4 m2 X-plots at every point of the 25-element squares in the lowland heath but at only 5 pre-selected spots of the 16-element squares

in calcareous grasslands (lines 333 to 335)? Larger 200 m2 X plots (unfortunately, as in line 347, also called X-plots), occurred in upland and coastal environments (line 340) or in upland and calcareous grassland sites (line 343) but not in lowland heath? In upland environments, these 200 m2 X plots occurred at 5 pre-determined points of the 25-element squares, while in coastal and calcareous grassland environments the X plots occurred at 5 pre-determined points of the 16-element squares. Five small Y plots occurred anywhere within upland, coastal and calcareous grassland squares, at the discretion of surveyors for random deployment? From this text we understand that calcareous grasslands had X plots, X-plots and Y plots, but these verbatim text extracts contradict what we read in Table 3. Trying to specify these sampling strategies in narrative text allows this confusion to arise. Replacement of, or perhaps supplements to, Figures 2 and 3, could go a long way to clarifying these various options. One could even show hypothetical boundary and streamside features? Rather than reproducing dull graphics from old reports, a small effort to produce fresh inclusive graphics could have a large positive impact?

On lines 356 to 358 the authors defend the CSS sampling approach. In truth, 25 years out, what could they change? Today, faced with complex 2-D biophysical patterns of plant abundance, one would develop a hypothetical species distribution (including pseudo-absences) based on slope, exposure, elevation, etc., compare or perhaps validate such distributions with remotely sensed colour or radiance data, then apply various tools (principle component analysis, cluster analysis, etc.) to develop a (one hopes) statistically valid sampling strategy. A question here, which perhaps the authors can't answer but should at least address, has to do with how different a strategy one could or should apply if one repeated this work now or in the immediate future. An essential question, hinted at (lines 410 and 411, lines 560 to 563) but not discussed in detail, arises: to detect and quantify change over 25 years, and admitting that one could today produce better masks for most of these vulnerable land cover types, would one necessarily repeat the exact analysis based on updated masks, go back to the same sites (at several points the authors mention 'permanent' markers evidently in anticipation that they or colleagues would return) or build a statistical model that would allow direct connection of today's or tomorrow's survey outcomes to these "baseline" data from 1992 and 1993? Scientific urgency accepted, logistically could we accomplish a repeat survey today? Sad to think not, but certainly presentation of this data carries with it the responsibility by these authors - beyond defending their own approaches and outcomes - to offer readers such an assessment?

Although the authors at several points in the abstract, introduction and conclusion mention the importance of the rare and perhaps disappearing plant communities and micro-environments as anchors of floral and faunal biodiversity, data presented here address only flora, not fauna. After repeatedly mentioning the relevance to birds, insects, amphibians, etc., the authors should admit and caution that this data includes only macro-vegetation? Although this reviewer found only plant species lists in all data files, I couldn't help feeling somewhat disappointed after the text had led me to understand their impact more broadly beyond only the vegetation.

This reviewer happens to know a few details of the Countrywide Survey. Most readers and data users will not. This data, addressing a provocative topic, could serve as enticement for researchers to turn to the larger longer records of the Countrywide Survey? Although this manuscript mentions intersection between the Countrywide Stewardship Scheme (designated CSS but the authors only use the acronym twice after the initial definition) and the Countrywide Survey (designated CS) multiple times in nearly all sections, we never gain clear understanding of a) how the two activities fit and b) of how the two survey activities differ. We know that Countrywide Survey conducted 5 mappings from 1978 to 2007. We know that those surveys missed - knowingly - the rare, unusual and/or threatened landscape features addressed by this CSS survey. We know that the same team of researchers conducted both surveys! We know that the Countrywide Survey recognised and corrected some methodological and terminology discontinuities in the interval between their 1990 and 1998 surveys. We know that both surveys relied on similar base data, sampling strategies, quality control procedures, data entry processes, etc. I itemise uncertain or confusing CS to CSS intersections in my detailed comments below but a basic observation applies: these authors never help us as readers understand clearly how the two mapping activities fit together. They could consider a table itemising similarities and differences?

The shapefiles of the land use masks, referenced under this doi:

, work well. I can open them with QGIS, view the database, understand presence / absence (1 / 0) structure, all good. I could, with time, reproduce landscape mask backgrounds as in Figure 1. Survey sites remain hidden, not an acceptable trade-off in the opinion of this reviewer but too late to argue that point.

The data files, under this doi:
, prove worse than useless. Their dismal quality and information should immediately earn a rejection from ESSD. If I didn't know other work by and good intentions of this group, I would recommend outright rejection. In not one of the seven .csv files do we find any metadata, units, explanations of headers, etc. One might expect, based on the sample design described extensively in the manuscript, to find some mention of squares. Never, not once, not even in the file with the word SQUARES in its filename. SERIES_NUM represents the sole common variable (column header) among all the files. Nowhere, not once, do we get an explanation or definition. How does SERIES_NUM relate to squares? No hint, no idea. We get - scattered across various files - GRIDCODE, HAB_TYPE, SP_LINK, HABT, HABT_DESC, LUSE, REP_ID, QUAD_TYPE, REP_CODE, PLOT_SIZE, SPECIES, COVER, SPNO, BRC_NUMBER, BRC_NAMES with nary a definition, unit, explanation, external link, etc. Under PLOT_SIZE we find countless 2x2 (metres, presumably, but zero explanation of any codes or units) and many 1x10 (presumably streamside or roadside but not one hint) but only (in my spreadsheet count) 238 14 x 14 (200 m2) large plots. But according to Table 3 we should find 241? Under PLOT_SIZE we find 351 1x10, while in Table 3 we should find 361? For 2x2, PLOT_SIZE gives 1297 values while Table 3 gives 1282. Nothing matches, no units, no explanations, even the file names leave us guessing. BD means boundary? LC means land cover? PLOT means? No readme files, no metadata lines at the top of the files, no explanations in the text. Useless. A competent reviewer would expect to find an easy path to reproducing and checking the shaded bolded values in Table 4. This reviewer finds absolutely no chance to accomplish that check. Data **not** ready for public display or use, the authors should withdraw them in embarrassment. Start from a well-described well-documented easy-to-use spreadsheet that you would find personally useful and feel proud to share - if you need a nice example look at what your neighbours over at UEA do with their very complicated but very accessible annual global carbon budget spreadsheet - then break that down into clear easy-to-reassemble .csv files with abundant metadata headers in each. You might need one composite product for features and a second for species but ideally readers and users would find easy close links to allow us to match species to features as you do. Give us detailed readme files and a detailed description with instructions in the text. Use an example Excel file if needed, to show how the .csv files work together. Extremely disappointing as presented, not up to standards of this group or of the journal.

Specific concerns (almost too many to itemise)

Line 30, climate change included as a possible forcing factor, but lines 45, 46 climate not included.

Line 50, introduction to landscape types addressed by the CSS: Countrywide Stewardship Scheme. The authors introduce the term 'key habitats' in quotes but the reader does not know whether that phrase came from the original contract language or represents a deliberate usage by these authors. Some definition of terms here would help!

Line 52 reference to Countryside Survey of 1990 but, due to time needed to compile and assess 1990 data from the Countrywide Surveys, features or outcomes from that 1990 CS mapping that might have proved relevant to these CSS surveys probably did not emerge in time to inform 1992 and 1993 surveys? Also strange to read about river valley and waterside landscapes as apparently covered in the CS (not in my memory but I focused on linear features of CS) but not in this survey when in fact later (lines 375 to 380) these authors discuss and define their S/W (streamside / waterside) survey efforts. Here we first encounter pervasive confusion about how CS and CSS fit together.

Lines 57 to 60, here we gain a relatively clear statement of the different mandates for CS and this CSS but then we encounter the unhelpful phrase "utilising comparable methods". Good! Which? How?

Lines 77 to 79: refers to "studies carried out in the last Century" but includes a reference (Steven 2007) from the present century?

Here also we find the familiar pattern of a sequence of references correctly punctuated within but missing punctuation (spaces) between. Reviewers see this often - a consequence of the imperfect merger of automated reference software with document software. Better that the authors correct the problem throughout the manuscript now rather than assume they or the typesetters will catch everything later at proof stage? As a reviewer who sees these small typos often, they suggest to me rather casual attention given to the quality of the product as submitted.

Lines 82, 83: designed to "integrate" with the Countryside Survey. Good again, but how?

Line 93: Here the authors provide a careful and accurate list of "landscapes", avoiding the term 'habitat' entirely. Here again they could define for the reader the terms they will use, including 'site' and 'habitat', throughout the remainder of the manuscript. And, one hopes, follow that precise terminology themselves?

Lines 98, By capitalisation here we understand these terms to derive from some other official or semi-official source. The Countryside Survey? Other structure or activity?

Line 108, Again capitalisation indicates some formal UK-based designation, but the authors provide no attribution.

Line 115, The four-digit numeric codes introduced here refer to the EU Habitats Directive or to an internal UK or CEH code?

Lines 115 to 117, Appreciate the precision of the species names here but also give us the common names of these heather plants? An example of understanding the interests and needs of a wider range range of potential users?

Line 150, Four-digit codes again, they must derive from the EU Habitats list but the reader should not need to guess?

Line 179, UK Biodiversity Action Plan, another source of terms and definitions?

Line 181, "special responsibility"? What does this mean in a UK or EU context? Will the UK now abandon these 'responsibilities'?

Lines 194 to 197, In these few sentences certain plant communities have "restricted distribution", but then "diverse geographic distribution", which somehow renders them "distinctive"? Assuming the authors have some valid points to make here, they have failed.

Lines 212 to 214, Here we read about consistency among sample designs but we get no details and no explicit mention of CS?

Lines 215, 216, An almost identical sentence appears in ESSD-2017-121 to describe the CS sampling design?

Line 221, Use of the terms designation and non-designation before the reader understands the meaning or distinctions!

Line 222, Finally, a useful definition of the term 'designated'! We should have had this definition up front, at the top of the narrative.

Table 1, line 279 - here we have ITE Land Classes with two-digit codes? If the authors need us as readers to understand these codes, give us an appendix table that lists them and their criteria?

Line 243, as in Table 1, ITE not defined? Most readers will wonder who produced what, a UK soils / landscape product?

Line 255, confused by the use of the term 'solid' in this context? Standard term from BGS categories? But reference to "drift deposits" (line 256) suggests unconsolidated soil features, different to 'solid' sedimentary limestones? Perhaps slight confusion here?

Line 285, What constitutes the variation to the Survey methods? Not the 1 km squares used by both CS and CSS. The within-square grid points and their application to lowland vs upland landscapes? The authors may understand these 'variations' but the reader does not.

Line 297, This sentence implies that CSS used the land use and land cover codes from CS 1990. But we know that CS revised its codes and terminology after 1990? Which specific codes? All? The features codes? The linear feature attributes? Again the authors presumably know these various codes and their use in both CS and CSS but readers do not!

Line 301, "supplied as supporting information with the data sets"? Where? Needed but missing!

Line 307, As written, the sentence refers to nearest vertical boundary taller than 20 m. Even in old England most hedges do not rise above 20 metres. The authors mean vertical features including fences with horizontal extents greater than 20 metres.

Line 316, We go from section 4.1.2 to 4.3. What happened to 4.2?

Line 341, Random not in the sense of at the discretion of the mapping team but random in the sense of five pre-selected randomised points of each grid?

Line 397, Should we understand 1km as lower resolution than other surveys or higher?

Lines 422, CS made extensive and quantitative use of these repeat visits. Here the repeat visits deserve mention but seem rather casual. No assessment of quantitative difference between initial visit and subsequent visit? Does this represent a difference between CSS and CS?

Line 429 and elsewhere: "permanent"? For what purpose? Anticipating a potential future re-survey?

Lines 451, 452: "previous intensification of agriculture"! Do the authors draw this conclusion from the outcomes of this CSS? I don't doubt their attribution of agriculture as a cause but do they have other evidence to point to?

Table 6: Where did these 'habitat indicator groups' come from? Why do we now discover, for apparently the first time, the terms 'main' vs 'habitat' applied to calcareous grasslands? Similar question for Table 4: where did the 'Broad Habitat' categories come from?

As in table 4, apparently most of the information in table 6, other than a few columns of a few select rows, comes from the Countryside Survey? But in table 4 the footnote indicates that only the all-England values (columns 2 and 3) derive from CS. If true, where does all the additional information conveyed in tables 4 and 6 come from? If this information shows the integration of CSS within CS, the authors should make that point more clearly? Here we finally might gain some context for the CSS work but the authors withhold that information from us?

Figures 3, 4: dismal. Evidently copied straight from prior reports. Exert some graphical effort and creativity here? Redraw Figures 2, 3 and 4 to some new combination that shows us X-plots, X plots, Y plots, S/W features, etc. You would need to move some text from narrative to figure legend but by doing so you would improve both the narrative and the figures?