

Interactive comment on “Ecological survey of the Native Pinewoods of Scotland 1971” by C. M. Wood and R. G. H. Bunce

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Response: Many thanks for the positive 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 L. Iverson

(1) I am impressed with the document and especially the data harnessed from 1971-2, to be available for resurvey. Long-term data are extremely valuable in these days of continued environmental change, and to detect and sort out potential causes of the changes, in this case, over 44 years and counting. The data are unique, collected at the beginning of Bunce's career, and now at the twilight of his career, I am delighted

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that his legacy for high quality British survey can be upheld in the Pinewoods, and available for resurvey hopefully in the near future. As defined here, the database is certainly useful and complete as well. I only have a few minor technical corrections to point out, by line number in the pdf document:

(1) 66 insert 'in Britain' after 'woods'

(2/3) Done

(1) 79 dozen forests lost – too vague – what defines a forest in this context?

(2/3) Lines 78 – 82 rewritten as: 'Prior to the Twentieth Century, the pinewoods were depleted due to a range of human factors. Particularly during the Seventeenth Century, the pinewoods were progressively exploited as deer hunting forests, for livestock grazing, and as a timber and fuel resource (Smout, 2006; Steven and Carlisle, 1959; Gimingham, 1977). There is documented evidence that at least a dozen former areas of native pinewood have been lost since that time, although it is difficult to determine the exact details of all of the lost areas of pinewood due to incomplete historic records (Smout, 2006).'

(1) 83 rewrite this sentence: The effects of these external influences had a range of effects.

(2/3) Edited lines 90+ to read: 'The consequences of these external influences on the pinewoods were threefold. Firstly, a reduction in area occurred, secondly a reduction in diversity occurred (Betula spp., Sorbus aucuparia and Juniperus spp. were all more abundant in the forests than now), and thirdly changes in the density and age structure of pure stands took place (Gimingham, 1977).'

(1) 109 'here' → 'there'

(2/3) Done

(1) 115 how many regions? I would prefer numbered bullets listing the region groups,

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mapped.

(2) Thank you for the suggestion.

(3) We have reformatted lines 129+ to include bullet points, and have added the Steven and Carlisle groups to the map in Figure 1.

(1) 123 not everyone knows dates of Queen Victoria

(2/3) Dates added

(1) 133 remove 'two'

(2/3) Done

(1) 157 827 ha is more than 800, listed prior.

(2/3) Thank you for spotting this - we have amended 827 to 710 ha (area of Glen Affric, the next largest in the list).

(1) 187 need period (2/3) Done

Response to Referee #2 B. Young

(1) I believe that this manuscript was well written and presents a solid foundation for the dataset collected from 1971-2. These types of data sets are increasingly important to enhance our understanding of forested systems over time given the long lived nature of trees. The data are unique in that they represent collections made some 44 years ago in a location that is ecologically rare today. The clear descriptions allow for the continual resurveying of the sites, hopefully soon, to enhance our understanding of these Pinewood systems. The database as defined in the article is both complete and useful. I only have a few minor technical corrections to highlight which are listed by line number from the pdf document. (1) Line 79: "forests" is very general. Please elaborate is it based on, percent cover, minimum basal area?

(2) We agree this isn't clear, and have rewritten the paragraph as below.

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(3) Lines 78+ rewritten as: 'Prior to the Twentieth Century, the pinewoods were depleted due to a range of human factors. Particularly during the Seventeenth Century, the pinewoods were progressively exploited as deer hunting forests, for livestock grazing, and as a timber and fuel resource (Smout, 2006; Steven and Carlisle, 1959; Gimingham, 1977). There is documented evidence that at least a dozen former areas of native pinewood have been lost since that time, although it is difficult to determine the exact details of all of the lost areas of pinewood due to incomplete historic records (Smout, 2006).'

(1) Line 82-83. Are these recent or historical climate factors?

(2) These are mainly historic climatic factors – clarified as below.

(3) Lines 85+ amended to: 'Some of the decline might also be attributed to historic climatic factors. As highlighted by Smout (2006), many lost pinewoods were located in the west of Scotland. As regeneration is known to occur more readily in the east where it is much drier, it seems likely that wet and windy oceanic weather occurring in the Sixteenth and Seventeenth Centuries would have had an adverse effect (Smout, 2006).'

(1) Line 109: "here" change to "there"

(2/3) Done

(1) Line 123: not everyone knows when "Queen Victoria" ruled. Add a date.

(2/3) Done

(1) Line 139: insert "natural" before "Scots Pine". Lots of Scots Pine has been planted in the western hemisphere.

(2/3) Done

(1) Line 141: What is "high rainfall"? Quantify or compare across other sites.

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(2/3/) Lines 157+ amended to: 'The region has a high rainfall (annual total in 2015: 2254mm) relative to the rest of Britain (annual total in 2015: 1289mm), and in comparison to the east of Scotland (annual total in 2015: 1368mm) (Met Office, 2016)'.

(1) Line 149-150: A set basal area per ha or percent cover could be used to quantify this.

(2) Yes – in a future survey, a better attempt at areal estimation could perhaps be made using a standardised method, as suggested. The main issue here is that the different areal estimates available from different sources vary significantly due to differing measurement criteria. These could perhaps be improved as we have suggested by aerial photo interpretation.

(3) We have amended the text to clarify this and add in the suggestion as follows: 'For example, it is difficult to determine the point where a forest becomes moorland with scattered trees and whether areas of bog within the woodlands should be included. This can partly account for the reason why different estimates of area are available from different sources, as described below. Areal estimates are provided in Goodier and Bunce (1977), as measured from the maps given in Steven and Carlisle (1959) and shown in Table 1. These figures could now be improved by interpretation of modern aerial photography, with forest being at least 30% cover (otherwise they should be considered as scattered trees) or a re-survey could perhaps provide improved area estimates based on a standard basal area per hectare'.

(1) Line 177: "habitat sheet" clarify what this is.

(2/3) Sentence deleted, and the previous sentence amended to: 'As described below, data were then collected on ground flora, tree and shrub layers and soils. Habitat characteristics were recorded for the both the individual plots and each wood as a whole.'

(1) Line 324-325: "Water levels"? is this precipitation amounts? Confusing. Line

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324-326: "The Scottish Pinewoods are characterised by 323 a diverse structure, with irregular tree spacings and sizes, diverse slopes, soils and also water 324 levels (Bain, 2013), Data from the survey provides information on the structure of the tree 325 layer". Sentence is not clear.

(2) We agree this is not clear, and have rewritten the paragraph as below.

(3) Lines 353+: 'The Scottish Pinewoods are characterised by a diverse structure, with irregular tree spacings, shapes and sizes. These variations occur as a consequence of the range of slopes and soil types on which the pines grow, ranging from freely drained thin podzol soils on steep rocky crags to wet peaty ground (Bain, 2013; Steven and Carlisle, 1959). Data from this survey provides information on the structure of the tree layer, including tree diameters at breast height and tree densities'.

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