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The use of digitally altered photographs to assess stakeholder woodland cover preferences in internationally important cultural landscapes; a case study in the English Lake District National Park. (Unpublished)

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Lemmey, R., Weatherall, A., Smith D. & Convery, I. (2018) The use of digitally altered photographs to assess stakeholder woodland cover preferences in internationally important cultural landscapes; a case study in the English Lake District National Park. *National School of Forestry, University of Cumbria Research Report.*

Abstract

This project explores the effectiveness of digitally manipulated photographs for evaluating peoples' preferences towards woodland cover in an internationally important cultural landscape. A photograph of a well known English Lake District view was digitally altered to produce six images with greater or lesser amounts of woodland cover. Using an online survey, respondents were asked to identify which image represented current levels and which their preferred levels of cover. The responses were then related to the personal data of the respondents. 506 usable responses indicated a strong preference for increased woodland cover. Accurate identification of the location and cover levels was related to proximity of domicile, age and frequency of visit. The nearer respondents lived to the Lake District the greater the preference for increased cover. Employment, domicile, age, gender, settlement type and voluntary organisation data were recorded. Women were less extreme in their preferences than men and farmers tended towards open field perceptions and preferences. Photomanipulation is shown to be an effective tool for assessing preferences for degree of woodland cover and could be well applied to more representative data gathering than online survey.

Keywords: Photomanipulation Tree-planting Attitudes Rewilding Lakes

1.1 Introduction

The European Landscape Convention 2000 which *promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues* came into force on 1 March 2004 (Council of Europe Treaty Series no. 176). The Convention requires understanding of public perception and expectation in the achievement of its aims. Sowinskaya et al (2014) outline a list of common approaches for gauging public attitude to landscape management and planning; public opinion poll, photograph evaluation, face-to-face or over-the-phone interview, indoor group discussion, discussion in the field, and internet-based systems. Loupa (2010) suggests the use of exploratory landscape scenarios, ordering one's perceptions of alternative futures. For this purpose, various visualisation techniques have been developed, such as drawings, walk-through or fly-through animations, digital simulation using GIS and 3D tools, and photorealistic representations.

Photomanipulation is commonly used to illustrate two extreme scenarios. For example, Simpson (2004) used photomanipulation to show the effects of management/no management policy upon a machair landscape in Scotland. Simpson, A. (2009) stressed that *'visual representations of landscape will, however, only be as realistic as the impact assessment procedures from which they are derived.'* The Forestry Commission also used photo-manipulation of woodland cover in their participation in the European Commission's VISULANDS project (2003–05). Lange et al (2013) in their study of the Alport Valley used 3-d GIS based computer simulations which facilitate 3-d 'travel' through the landscape. In this study they presented three landscape scenarios; the status quo, after woodland harvest and after re-planting (Lange et al 2013). These are three contrasting simulated landscapes in which opportunities for selections of degree were not presented. 'Paysage 2020', the report of the Swiss Office for Environment, Forests and Countryside (2003), however did use graded photomanipulation to illustrate how forest can encroach upon isolated land. These images were purely illustrative however and had no quantification.

In January 2013 the UK government published its Forestry Policy Statement (UKFPS,2013) that was, in part a response to a report from the Independent Panel on Forestry (IPF2012). In the UKFPS the '*need for active management*', '*close partnerships*', '*community involvement*' and '*the importance of character and distinctiveness*' in woodland policy were clearly acknowledged. Implicit in this was the importance of the character of woodland landscapes, a point being reiterated from section 117 of The National Planning Policy (2012) which stated that there must be a 'plan for diversity at the landscape level'. The Policy Statement refers to 'the principle of the right tree in the right place' and thus the government establishes its commitment to consultative woodland landscape planning. This paper suggests a methodology that could assist with the definition of 'right tree' and 'right place' within such a consultative process.

Currently 10% of England's land area is covered by trees (Forestry Statistics.2014). One of the principal recommendations of the IPF was for the '*Government to commit to an ambition to sustainably increase England's woodland cover from 10% to 15% by 2060.*'(IPF 2013) (*Recommendation no 16*) . Current planting rates would achieve a 11% total cover by 2060(UKFPS2013) The UK government response to this was to agree an increase to 15% but with no defined time period. £6 million was been directed towards tree planting in 2014/2015 (Defra2014) however only 3300 hectares of a target of 5000 hectares of net afforestation was achieved (Forestry Commission 2014). In order to fully understand the reasons behind this there is a need to engage more fully with stakeholders.

The distribution of tree cover also has significance within the concept of 'Rewilding' (Foreman 2004) since such projects require the restoration of connectivity between fragmented habitats. Whilst rewilding might imply conflict between existing management practice and conservation Monbiot suggests that '*conservation has sought to freeze living systems in time*' and that rewilding measures '*should only happen with the consent and enthusiasm of those who work*

upon the land' supporting a consultative and inclusive approach towards ecological change. In Switzerland, where public opinion has been assessed, 51.1% were found to be wilderness opponents and 49.9% wilderness proponents (Bauer 2009).

Stakeholders in this context are very heterogeneous in that they have different perceptions of the use and nature and woodland and have contrasting aspirations for their management. In studies of National Parks this heterogeneity of the community can result in a diverse range of attitudes and perceptions (Xu et al 2006) (Suckall et al 2009). Often local stakeholders do not share common norms (Reed et al 2006). The variety of perceptions arising from this diversity may arise from differing class and ethnicity (Suckall et al 2009) but also from place of residence (Petrosillo et al 2007) and knowledge of the past (Hanley et al 2009). Consequently it is important to gauge how stakeholders perceived different woodland cover scenarios in order to make evidence based decisions about how increasing or decreasing woodland cover in a landscape may be appropriate. Planning decisions that are significantly top-down are problematical (Hanley et al 2009) (Furst et al 2010) and the UK government acknowledges that '*a true and sustainable woodland culture needs to be built from the ground up and must be based on the needs, interests and enthusiasm of local people.*' (UKFPS,2013).

This study presented respondents representing a wide range of stakeholders with six images of one iconic Lake District landscape that had been manipulated to show a continuum of woodland cover from greatly reduced to greatly increased relative to the current level of woodland cover. Two main questions were asked; 'which image corresponds to your view of how it actually is' and 'which corresponds to how you would like it to be'. By relating these responses to the biographical data of the respondents potential variations within the stakeholder types in relation to perception and preference were analysed.

2.1 Methodology

Using a base photograph of the Borrowdale Valley in the Lake District National Park (taken from Castle Crag OL4 GR252158 Bearing 150 deg) , a range of photographs were produced which were altered to show greater or lesser levels of tree cover.

(http://www.hilltoppartnerships.co.uk/Hill_Top_Partnerships/K17.html)



Most Cover



Actual Cover



Least Cover

The photographs were coded with randomised numbers and letters and then presented non-sequentially through a Survey-Monkey online survey. (<http://www.surveymonkey.com>)

Respondents were asked to identify which image they perceived as being current reality and the one they viewed as having a preferable level of tree cover. They were also asked a range of questions relating to themselves (see list.1) and given an opportunity to comment upon the process.

Table 1: List of questions

1	Do you recognise the view?							
2	Where do you think it is?							
3	Which image represents current reality?							
4	Which image do you like best?							
5	How frequently do you visit for recreation?	Daily	Weekly	Monthly	6 Monthly	Annually	Never	
6	How frequently do you visit for work?	Daily	Weekly	Monthly	6 Monthly	Annually	Never	
7	How frequently do you commute through?	Daily	Weekly	Monthly	6 Monthly	Annually	Never	
8	Where is your home?	B'dale	Lakes	Cumbria	UK	UK		
9	In what type of settlement?	Rural scattered	Rural hamlet	Rural village	Rural market town	Urban fringe	Urban	
10	Organisation membership	RSPB	BTO	National Trust	Wood land Trust	Friends of Lake District	Green peace	BASC
11	Which organisation represents your view?	RSPB	BTO	National Trust	Wood land Trust	Friends of Lake district	Green peace	BASC
12	Gender	F	M					
13	Age	15-29	30-44	45-59	60-74	75g		
14	What type of employment?	Farming	Forestry	Land Mgt	Wildlife Conservation	None of these		
15	Any further comments?							

A pilot version of the survey was tested in two trials, firstly on a group of twenty undergraduate students and secondly on seventy two attendees of a public lecture at Carlisle Natural History Society. Appropriate adjustments to the procedure and questions were made based upon the responses. The online survey itself ran from 17th March 2014 until the 26th May 2014. Awareness of the survey was spread through social media, email, a conference presentation and the University of Cumbria website. The survey was closed once the number of responses per week appeared to have peaked.

Table 2: Randomised image codings and order of woodland cover.

Woodland Cover	Randomised Code	Woodland Cover Ranking
MOST	K17	6
	B5	5
ACTUAL	Z12	4
	F15	3
	A3	2
LEAST	H4	1

In the remainder of the paper the Woodland Cover Ranking will be used although respondents were not aware of the ranking when they answered the questions.

2.1.4 Analysis

Table 3. Contingency Table for the Chi Squared Test of Perception/Preference data per image.

	Perceived	Preferred
K17	16	245
B5	29	106
Z12	59	74
F15	47	33
A3	140	24
H4	215	24
n	506	506
mean	84	84

Chi Squared Value= 483.643 $p < 0.001$ indicating a highly significant non random distribution.

(Statistical testing of the class combinations is inadmissible owing to the range in combination values and the presence of zero values in some classes.

3.1. Results

There were 596 respondents to the online survey, however only 506 completed the survey sufficiently for their data to be used. This was because it was considered important that answers to questions 1 – 4 could be cross-referenced to respondent data. A full data set of results is presented in Appendix A. Where class sizes are less than 5 they are not included in the comments on the data. Below is a range of summary tables relating to overall and specific issue data.

The main aim of the survey was to determine which view respondents thought represented

current reality (Q3 Table1) and which view they preferred (Q4 Table1). The responses to these questions are compared in Table 4.

Table 4: The relationship between respondents' perceptions of reality and their preferred levels of woodland cover. (n=506). The numbers in the boxes represent those who selected that particular combination of 'perceived' and 'preferred' with that number represented as a percentage of the whole. The actual cover class is highlighted in red.

		Perceived Reality						Total	
		Less cover			More cover				
		1	2	3	4	5	6		
Preferred Cover	More cover	6	113 (22.33%)	63 (12.45%)	21 (4.15%)	26 (5.13%)	13 (2.56%)	9 (1.77%)	245 (48%)
		5	31 (6.12%)	34 (6.71%)	17 (3.35%)	15 (2.96%)	6 (1.18%)	3 (0.59%)	106 (20.9%)
		4	32 (6.32%)	17 (3.35%)	6 (1.18%)	12 (2.37%)	6 (1.18%)	1 (0.19%)	74 (14.60%)
		3	15 (2.96%)	11 (2.17%)	2 (0.39%)	3 (0.59%)	2 (0.39%)	0 (0%)	33 (6.52%)
		2	10 (1.97%)	10 (1.97%)	0 (0%)	2 (0.39%)	1 (0.19%)	1 (0.19%)	24 (4.74%)
		1	14 (2.76%)	5 (0.98%)	1 (0.19%)	1 (0.19%)	1 (0.19%)	2 (.39%)	24 (4.74%)
		Total	215 (42.2%)	140 (27.6%)	47 (9.28%)	59 (11.6%)	29 (5.73)	16 (3.16%)	506 (100%)

From the totals row at the foot of Table 4 it can be deduced that 79.4% (i.e. 42.2% + 27.6% +9.28%) respondents perceived that there was less woodland cover than currently exists (i.e., 402 respondents). Only 11.6% respondents correctly perceived reality (59 in all) whilst 8.8% (5.73% + 3.16%) of respondents thought that there was greater woodland cover than is actually present (Table 4).

The totals column on the right hand side of Table 4 shows that 68.9% (i.e. 48%+20.95%) preferred greater woodland cover than currently exists (i.e. 351 respondents), 14.6% favoured current woodland cover (74 respondents) and 16% (6.52% + 4.74 + 4.74%) would prefer less woodland cover than exists now (81 respondents)(Table 4).

3.2. Image Recognition

Respondents were asked whether they recognised the site (Q1, Table 1). If so, this recognition was checked (Q2, Table 1)). Responses fell into three categories; accurate recognisers, inaccurate recognisers, those who thought that they knew the view but did not, and non-recognisers who knew they did not recognise the view.

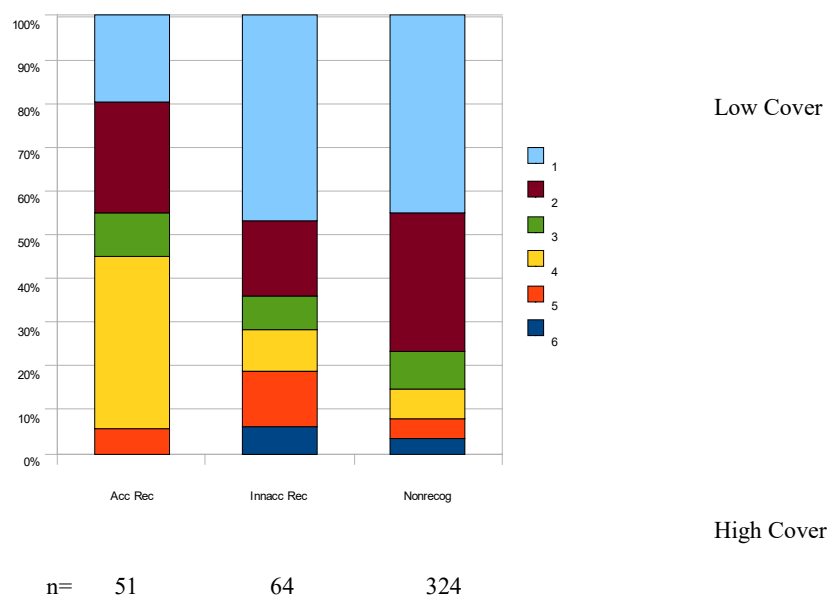


Figure 1: Graph of the distribution of classes of 'accurate recognisers'(n=51), 'inaccurate recognisers' (n=64) and 'non-recognisers' (n=324) for perceived reality.

Of the respondents that accurately recognised the site 37% (n=59) identified the correct image for the current level of woodland cover (4). The responses of the accurate responders were then analysed in relation to their perceptions and preferences as a separate group.

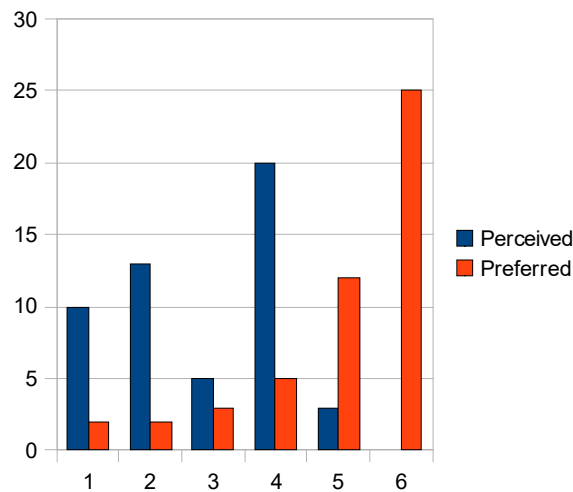


Figure 2: The Perceived Reality (Blue n=51) and Preferred Classes (Red n=49) of accurate recognisers. (n=125)

Those respondents who accurately recognised the view also demonstrated an ability to assess current woodland cover, with a strong preference for image 4, current reality, and also a reluctance to select the extreme woodland cover groups. The responses of the respondents who claimed to recognise the location but who were in fact inaccurate were similarly isolated and analysed.

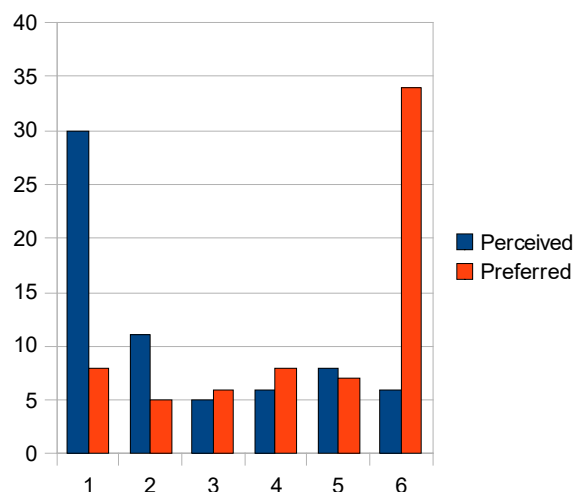


Figure 3: The Perceived Reality (Blue n=66) and Preferred Classes (Red n=68) of respondents who claimed recognition but were inaccurate.

The inaccurate recognisers were not only inaccurate but selected more extreme images than the non-recognisers. This might suggest a strong attachment to the Lake District that then translates into a strong view regarding woodland cover. Those respondents who had no recognition of the location were analysed for perceptions and preference. The respondents who did not know this particular view imagined it would contain less woodland cover than it does, but preferred more (Figure 4).

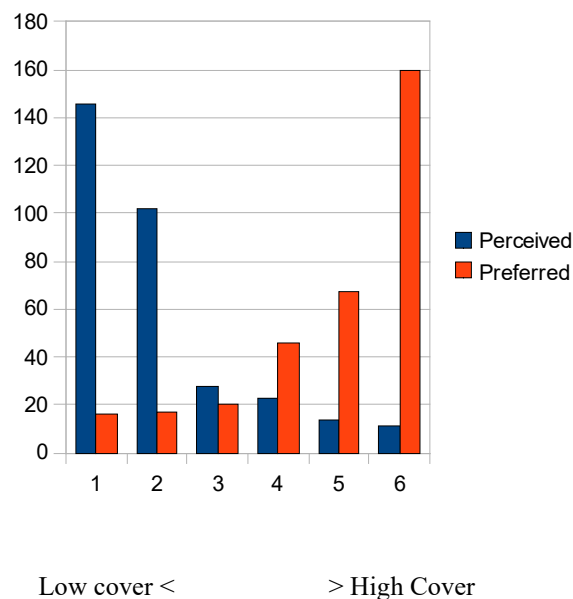
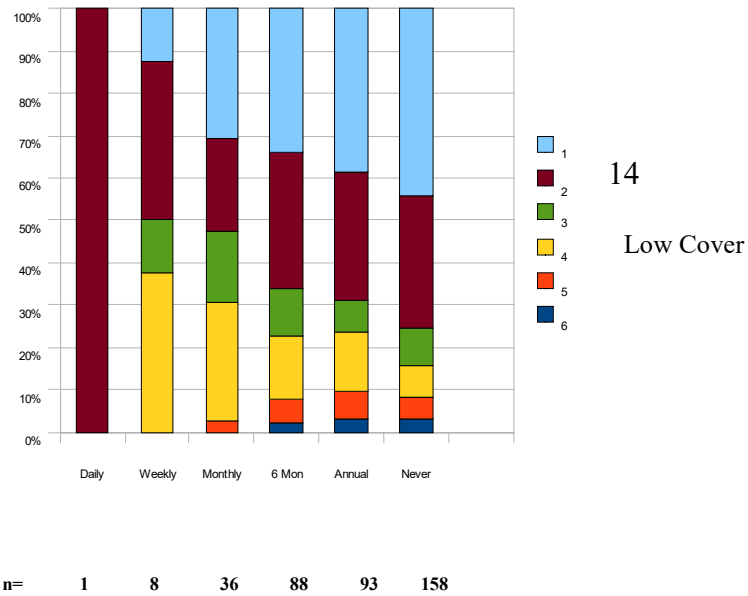


Figure 4: The Perceived Reality (Blue n=324) and Preferred Classes (Desired n=326) for respondents NOT claiming recognition.

3.3 Frequency of Visits.

An increased frequency of recreational visit to the Lake District might be expected to increase accurate identification of woodland cover and so a question to cover this was included in the survey (Table 1 Q5).



High Cover

n= 1 8 36 88 93 158

Figure 5: The distribution of classes perceived as reality with relation to frequency of recreational visit to the Lake District .

Results support this showing that the range of perceived cover images is lower the more frequent the recreational visits, indicating greater consistency and accuracy. The frequency of perceptions of the correct image 4 is greater for weekly visitors and declines as visits become less frequent.

The same question (Table 1 Q 5) was analysed for preferences.

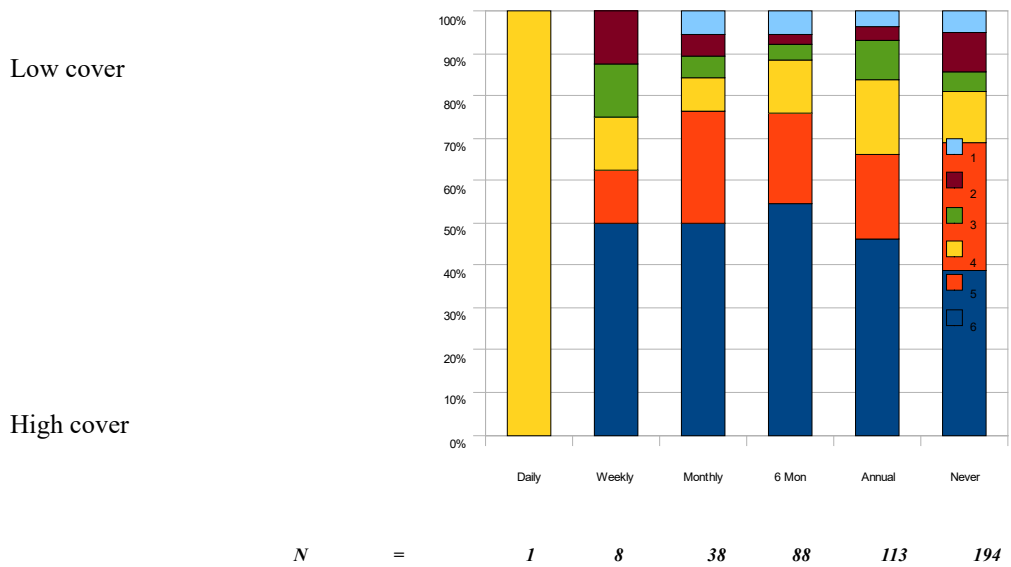


Figure 6: The distribution of preferred classes with relation to frequency of visit to the Lake District.

Frequency of recreational visit has less influence upon woodland cover preference although over 60% preferred greater than current levels of cover in all visit classes. 75% in all cases preferred levels of cover equal to, or greater than, current levels.

The 'work' and 'commute' data (Table 1 Q 6 and 7) produced groups with less than the minimum data and were completely dominated by those who did not work or commute there.

3.4 Settlement Type

3.4.1 Responses were analysed to investigate the relationship between perceptions(Figure7) and the settlement type in which they lived (Q9 Table1).

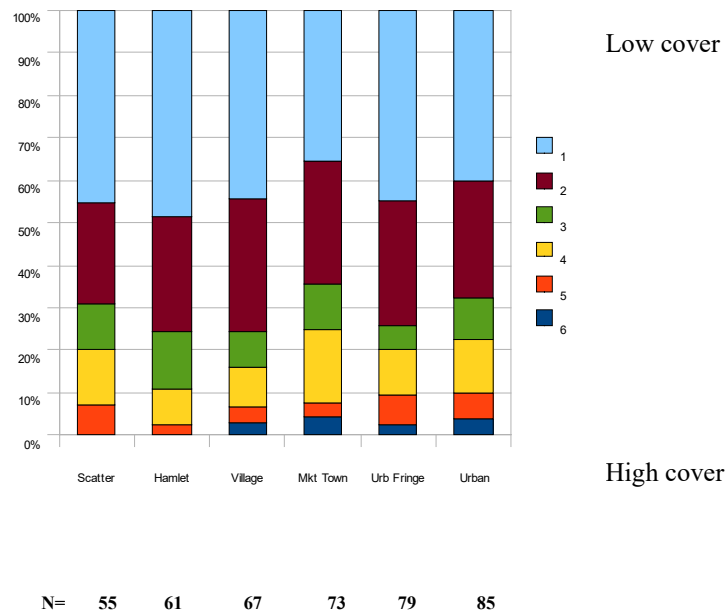


Figure 7: Frequency of perceived woodland cover with respect to the respondents' settlement type.

There was no evident pattern relative to settlement and perception. Consistently at least% of all classes showed a perception that current woodland cover was actually less than in reality.

Responses were also analysed to investigate the relationship between preferences(Figure8) and the settlement type in which they lived (Q9 Table1).

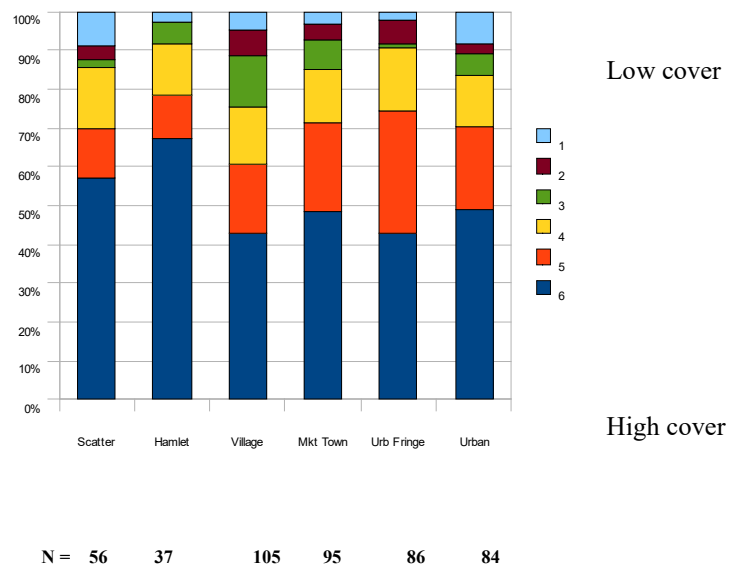


Figure 8: Frequency of preferred woodland cover with respect to the settlement type of the respondent.

There was no evident pattern relative to settlement and perception. Consistently 60% of all classes showed a preference for increased woodland cover.

3.5 Domicile

The respondents were asked to identify their home area or domicile and were given five options that reflected increasing distance from the location (Q8 Table 1).

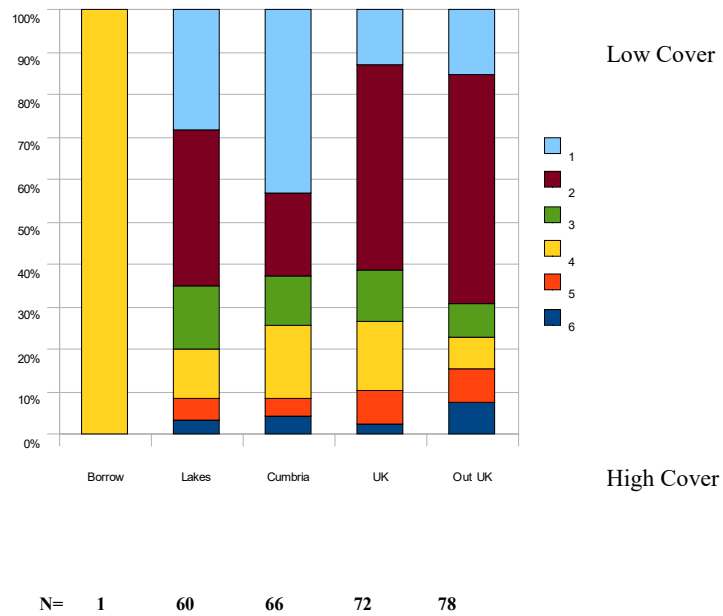


Figure 9: Frequency of perceived cover related to domicile.

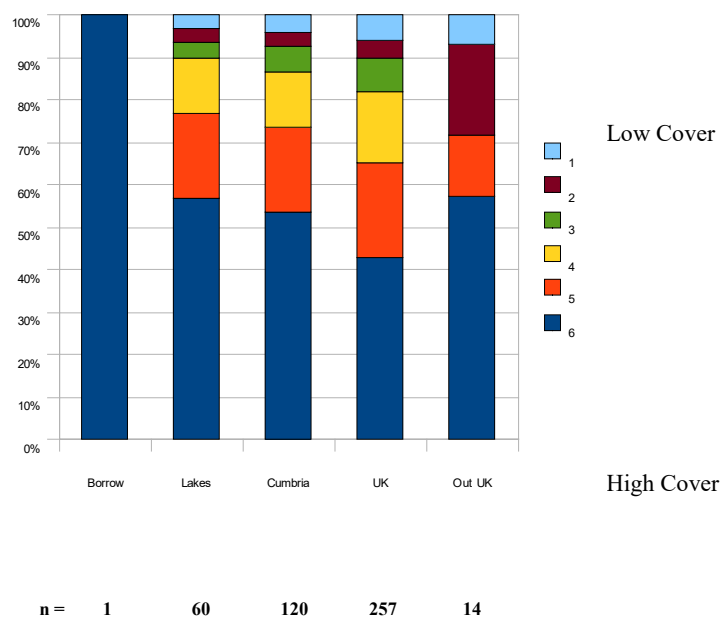


Figure 10 : Frequency of preferred cover related to domicile

Analysis of the perceptions for each of the five domicile options shows that there is a general perception that there is a lot less cover than there is with between 75% and 80% selecting less covered images (with the exception of the single Borrowdale resident whose perception was accurate).

The preferences of the five domicile options all favoured more woodland cover with the least frequency being 65% for increased cover from those living elsewhere in the U.K. However the trend that can be seen in the data is for a greater level of preferred woodland cover the nearer to the site that people live, if they live within the U.K. Those living outside the UK favoured greater levels of the more extreme woodland coverage possibly reflecting their own indigenous woodland covers.

3.6 Organisational membership

Respondents were asked to identify which of the listed organisations they had membership (Q10, Table 1) and this was then related to woodland cover perception (Figure 11) and preference (Figure 12).

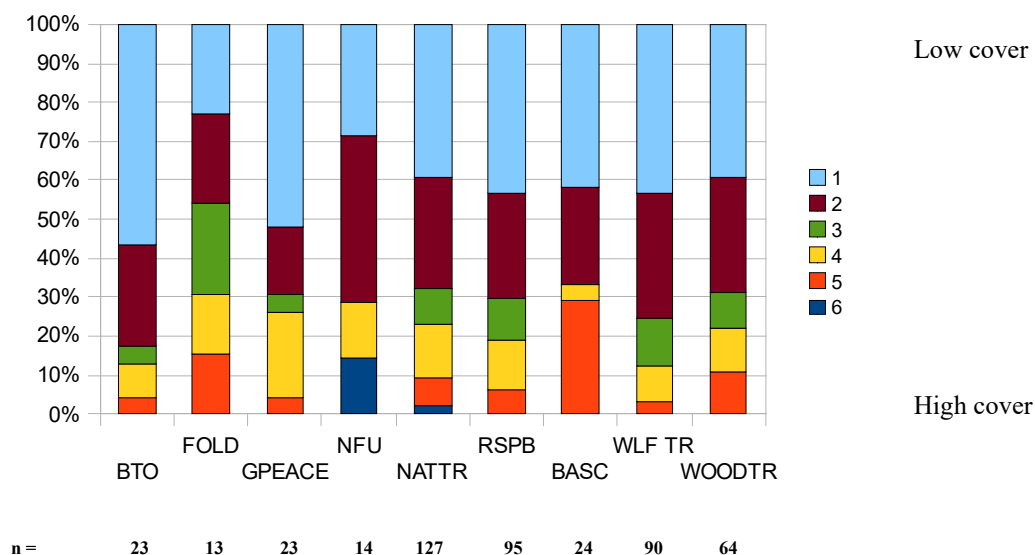


Figure 11: Organisational membership and perception.

The perceptions of organisational members suggests little obvious trend other than that of the British Trust for Ornithology members who perceive lower tree cover than most whilst the Friends of the Lake District have a more realistic perception (Figure 11)

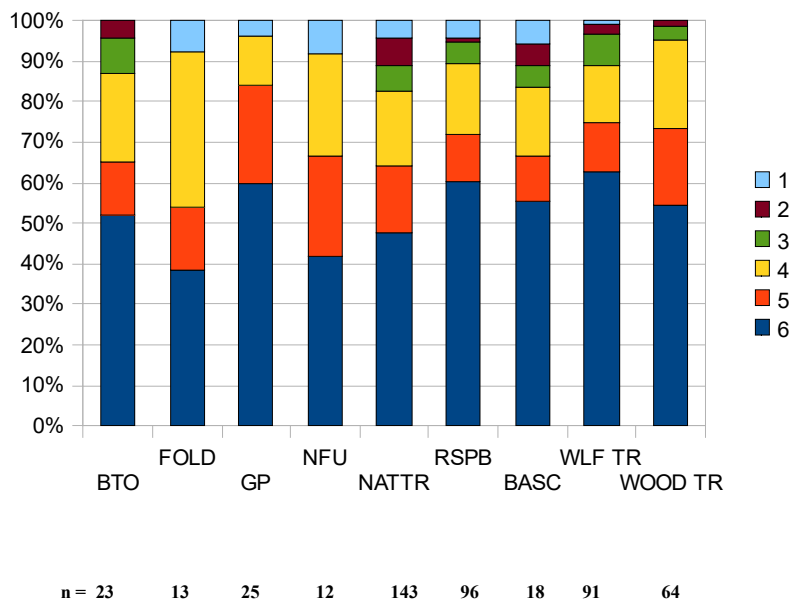


Figure 12: Frequency of preferred cover classes for members of different organisations.

The preferences of organisational members (Figure 13) show that in all cases over 83% preferred woodland cover levels equal to or greater than present and 54% preferred greater levels. The Friends of the Lake District were again distinctive in that they show the greatest preference for the status quo.

3.7 The organisation that best represents views.

Respondents were also asked to name organisations that best represented their views (Q11 Table 1). Their perceptions are shown in Figure 13 and their preferences in Figure 14.

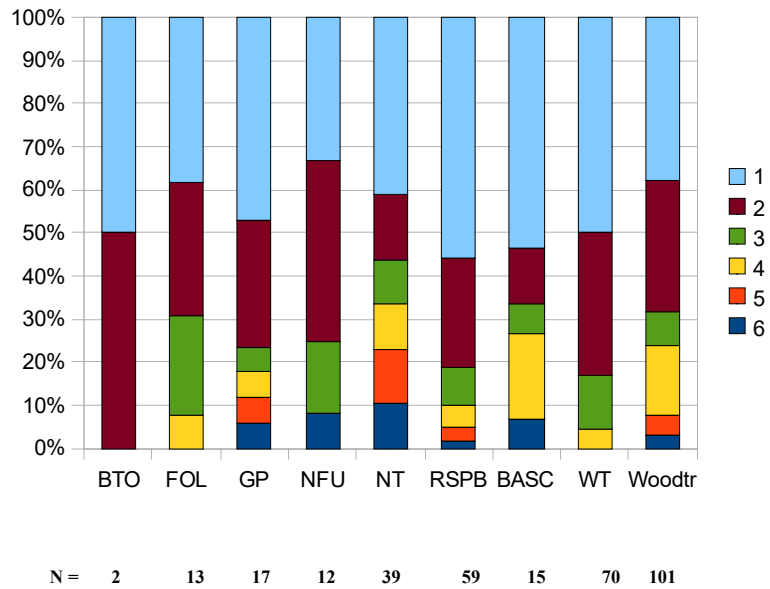


Figure 13 : Frequency of perceived cover classes related to organisations that represent views.

Respondents who shared views with National Trust (NT) showed the greatest discrimination and the highest scores for perceptions of the woodland whilst respondents who shared views with the Wildlife Trusts (WT) had the lowest scores for perceived cover.

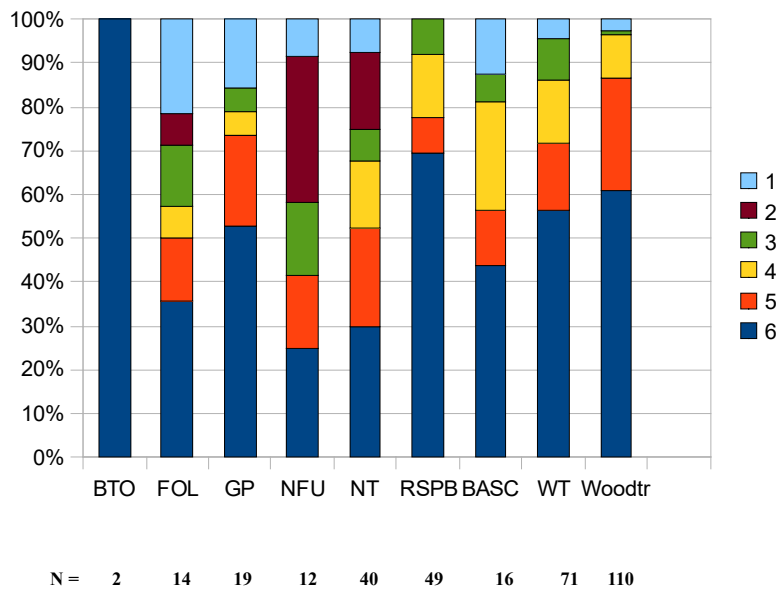


Figure 14: Frequency of preferred classes related to organisations that best represent views.

Data for preferred levels of cover (Figure 14) indicate that the Friends of the Lake District (FOL), the National Farmers' Union (NFU) and the National Trust (NT) favoured the lowest levels of cover and the RSPB and the Woodland Trust favoured the highest levels of woodland cover relative to the other organisations. Those who identified with the NFU were the lowest in terms of preference however even in this case 40% favoured increased woodland cover.

3.8 Employment

Respondents were asked to identify which employment group they belonged to and this data was analysed in relation to perception (Q14 Table 1).

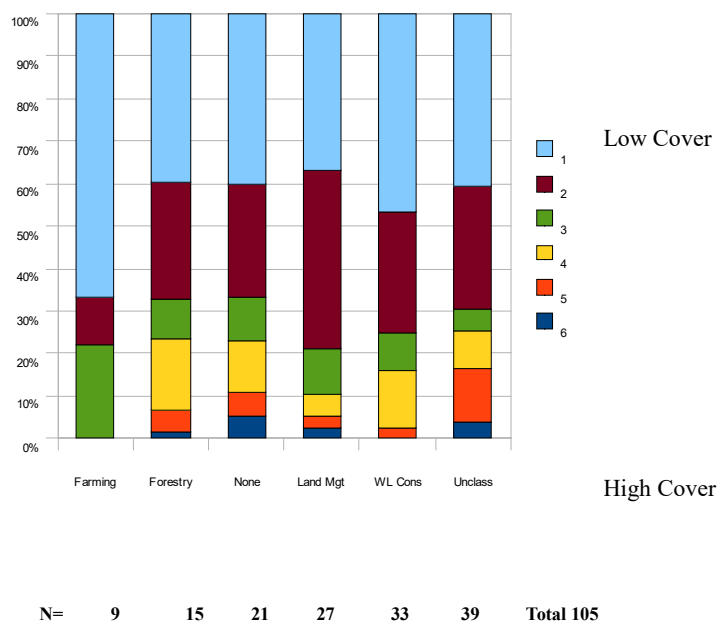


Figure 15: Frequency of perceived cover classes for members of different employment groups.

The perception of current woodland cover being less than current levels was over 70% in all employment groups. Farmers perceived very low levels of woodland cover (Figure 15) with all in the group perceiving less than current levels..

Preferences for all the same groups were similarly analysed.

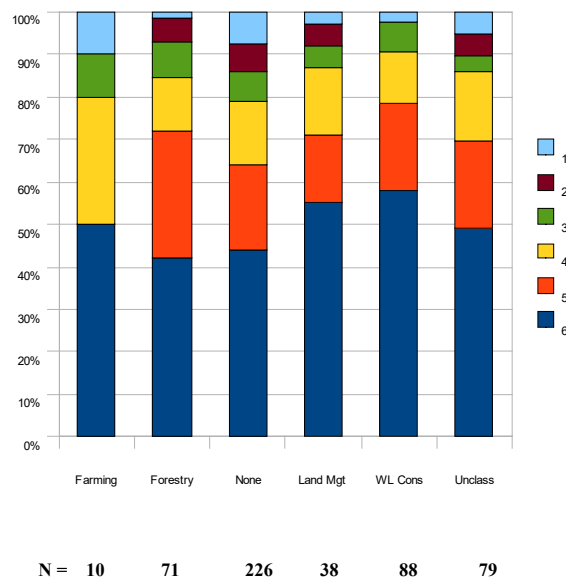


Figure 16: Frequency of preferred cover classes for members of different employment groups.

In the data for preferred cover farmers produced the lowest preferences amongst the groups but still 50% favoured an increase on current levels (Figure 16). The group most favouring increase were the Wildlife Conservationists of whom 78% favoured an increase in woodland cover (Figure 17). Respondents in Forestry employment had the lowest percentage preferring the highest level of woodland cover.

All groups substantially favour increased levels of cover and there is a tendency for foresters to demonstrate a less extreme preference for future planting.

3.9 Gender

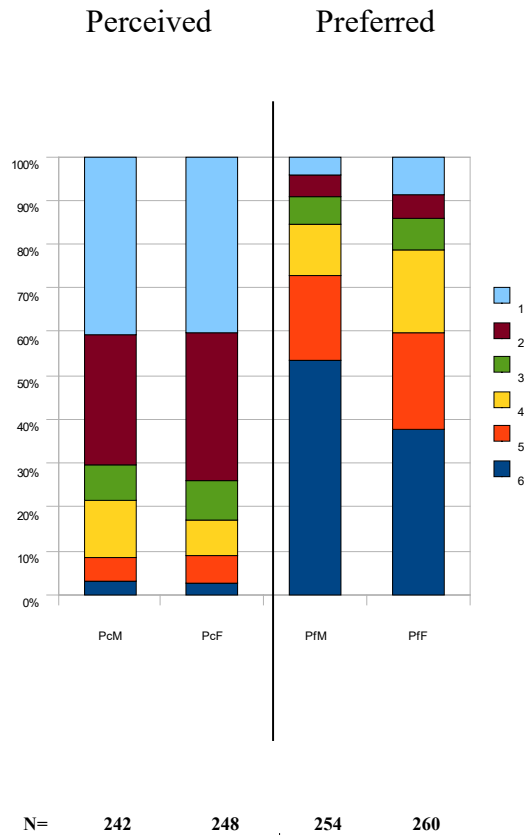


Figure 17: Frequency of perceived and preferred cover classes for different genders.

Male and female perceptions are almost identical but their preferences differ in that women take a markedly less extreme view of future levels of increased cover (Figure 17).

3.10.0 Age

Cover preferences for different ages were asked through Question 13 Table 1.

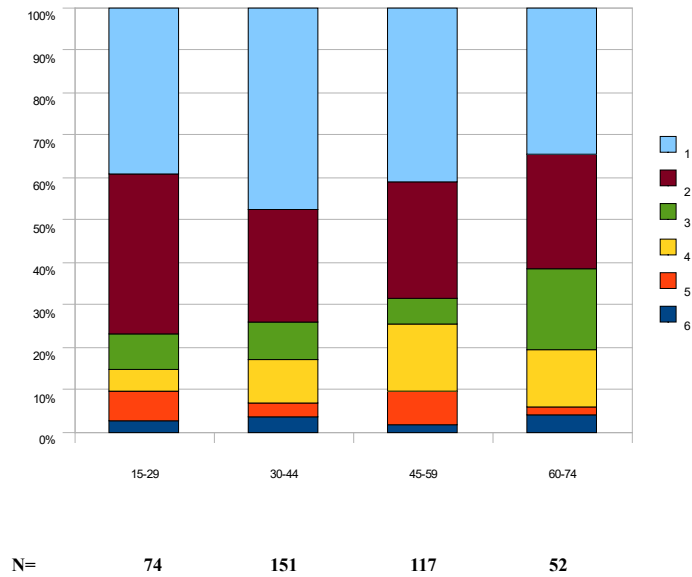


Figure 18: Frequency of perceived cover classes for different age groups.

If the data for the real cover (group 4, yellow) is combined with the close to reality groups (3 and 5, green and orange) then data indicate an increasing accuracy of perception of woodland cover with increasing age. (15-29:95, 30-44:22.5%, 45-60: 30% and 60+: 34%).

The relationship between age and preference may be similarly analysed.

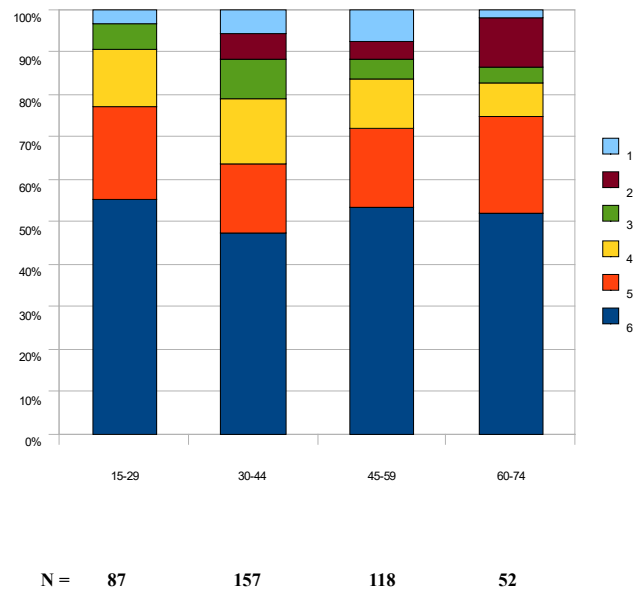


Figure 19: Frequency of preferred cover classes for different age groups.

There appears to be no relationship between age and woodland cover preference.

3.11 Personal responses.

The personal responses to the questionnaire were overwhelmingly positive in terms of its interest, ease of completion and timeliness. There were 71 discursive responses. The comments fed into three groups; supporting an increase in the cover, maintaining the character of the landscape and the methodology of the questionnaire.

The comments that referred to tree cover (25/71) were strongly in favour, except one, of increased tree cover in the Lake District National Park. These were qualified by anxieties over the style of distribution and species in the landscape. The importance of farming and stocking decisions was stressed by some (5/25). Diversity and species mix were important to commentators upon management.

Landscape issues were specifically referred to by 9/71 respondents. Four stressed the importance of open fell to this type of landscape and five commented upon how their responses, owing to lack of familiarity, were informed by internal archetypes derived from other locations such as Scotland, Wales and Scandinavia. 'To me, as a Scandinavian, most of Cumbria is just a lack of forest!!'

Methodological comments focussed upon the differences between the images and how these were difficult to perceive (13/71). Some suggested fewer images whilst others suggested a greater range of cover scenario. 12 commented upon the ease of completing the survey relative to the amount of information and one respondent was concerned by how representative the group was. Remaining comments were emotional responses such as 'surprise', 'enjoyment' and 'doubt'.

4.1 Discussion

This study has shown that, for this particular group of respondents from a range of stakeholders, there is a strong preference for increased cover in this specific woodland landscape.

Photomanipulation of images to provide a continuum of tree cover levels has been demonstrated to be useful in demonstrating grades of perception and preference in a range of stakeholders. The majority of respondents perceived the landscape to have fewer trees than it does in fact and also preferred landscape options of increased tree cover. Several factors affected accurate perception of current cover, principally frequency and therefore familiarity with the landscape, as might be expected.

Examination of the responses according to the respondent classes showed varying degrees of desire for increased woodland cover. The domicile of the respondent was shown to be relevant, as shown by Petrosillo (2007) as was age and familiarity which corresponds to the findings of Hanley (2009). The clear trend relating recognition to frequency of visit/ proximity of domicile showed that series of graded images are capable of identifying trend and therefore are a valid method of

assessing graduations in opinion. However, this particular group of respondents cannot be said to be representative of the range and number of relevant stakeholders. Further study is required to increase representativeness.

Where respondents recognised the location (Figure 3) this distribution was moderated by those who also accurately identified the current woodland cover, but even in this case the perceived and preferred extreme images (images 5 and 6) are still dominant. This may have been an artefact of attempts to give extreme data in order to support the case for increased cover and given the employment group and organisation group of the respondents this might indeed have been the case. The employment group data showed foresters to be more moderate than conservationists. Figure 4 shows that when respondents do not recognise the view there is a tendency to assume that woodland tree cover is represented by the lowest cover image of this location (Image 1 H4) and to prefer the image with the greatest cover (Image 6 K17).

This particular woodland landscape, despite being well-known and represented widely in the media, is not representative of the Lake District National Park as a whole, being considerably more wooded. The validity of inferring that respondents prefer increased cover in the Park is questionable in that it may be that either respondents may perceive that woodland cover should be increased where it already exists or increases in cover are desirable in the Lake District National Park.

The ability to identify the location and the present level of woodland cover was a function of familiarity. The more frequent the visits, the nearer the domicile and increased age all increased accuracy of recognition. The nearer the respondents lived the greater their relative accuracy of perception and also the greater their relative preference for increased cover. The further away they lived the less their relative preference for increased woodland cover but none the less even for the

most distant 66% still preferred increased cover. This could be for a number of reasons, for example, the rest of the UK having a more wooded landscape and therefore a treeless landscape being viewed more positively or the fact that people in the Lake District have a better understanding of working landscapes and are well disposed because of a greater environmental enthusiasm. Whichever reason, this supports the findings of Petrosillo et al (2007) in which the attitudes people living in or close to a conservation area contrast with those people living further away.

Settlement type has a similar effect as domicile in that the more urban the less, comparatively, is the desire for increased woodland cover although in overall terms they still wanted more woodland cover but not as much as non-urban dwellers. Scattered buildings and hamlets may have a predisposition to greater cover through factors such as exposure, woodfuel, biodiversity or environmental philosophy as well as those outlined in the previous paragraph.

Respondents who had no knowledge of the Lake District could not be informed by local information but must none the less have been influenced by factors such as perceptions of other similar areas (e.g. Scandinavia), images from the media (Cumbria Tourism) and cultural influences such as Beatrix Potter, Arthur Ransome and Alfred Wainwright. The interaction of these factors constructs an archetypal mental image against which the images were compared.

Employment and organisational membership present a more direct cognitive influence upon responses. The responses of farmers and NFU members and sympathisers were notable in that they perceived less cover than the other groups and also preferred less relative cover than the other groups although 42% still preferred more cover than current reality. This may reflect a pre-occupation of farmers with grazing fields in this area. The Friends of the Lake District also demonstrated a greater accuracy of perception of the location and also the highest preference for the current woodland cover. Wildlife Conservationists, Wildlife Trust members and Woodland Trust members produced the highest woodland cover preferences reflecting the tenets of their respective

organisations.

Where image frequencies are less extremely skewed then this in turn may be attributed to greater discrimination as demonstrated in the case of age and gender where 30 - 44 year old females are more discriminating than 15 – 29 males.

The comments of the respondents raise justifiable issues of representativeness of the sample and how to address the qualitative issues of the gradations between images. The use of Survey Monkey as the principal platform for data gathering immediately selects for a) people who sufficiently computer literate to fill in the questionnaire and b) people who are 'selected' by pre-respondents to be recipients of emails, facebook friends or fellow colleagues. Given that like will select like, it is almost unavoidable that this survey cannot be seen as representative of a sufficiently wide population. Yun and Trumbo (2006) found that the response rate and representativeness of the electronic survey group may be skewed relative to the target population by virtue of gender, age and computer literacy and warned that researchers must still be concerned about the social and economic representativeness of online samples. None the less 506 usable responses were achieved and all groups were represented to some extent e.g. farmers.

Greater validity could be achieved either by a wider survey or by using Random Stratified Sampling in the design of the questionnaire and analysis of the data. Multi-mode survey techniques could also improve the representativeness of the sample, without biasing other results (Yun and Trumbo 2006). Species mix and distribution of deciduous broadleaves and conifers are also seen by many as significant to the selection of options and this is where graded series of photos may help with policy decisions. The area of tree cover and the relative distributions of spatial, line and single tree features are important to the definition of landscape character and it is by photomanipulation of these features that different options can be made visible, for example in conjunction with the Lake District National Park Landscape Character Assessment or Land Cover Map 2007 in the

Countryside Survey (2011) produced by the Centre for Ecology and Hydrology. .

5.1 Conclusions

Photomanipulation of wooded landscapes to assess attitudes towards future planting across a range of stakeholders has clearly been shown to be effective. In the sample, there was a clear desire to see more tree cover than at present. The preference for increased cover showed a number of influences. The data suggest that the closer respondents live to the Lake District and the less urban their domicile the greater the desire for increased woodland cover. One of the clearest trends is the dissimilarity between the attitudes of men and women towards preferred levels of woodland cover with women showing a greater reluctance to use the extreme classes of cover type. This may be because of differing attitudes towards surveys and/or trees. Membership of special interest groups indicated individual perceptions exactly. Ornithologists preferred the greatest increase in cover and members of the National Farmers Union and Friends of the Lake District preferred least. More sophisticated manipulation of tree distribution variables, such as spatial, linear and point distributions, combined with species options, could provide an easy, cheap and accessible tool for gathering data to inform policy decisions. Such targeted surveying is appropriate to specific landscapes and could be combined with existing datasets such as the Lake District National Park's Landscape Character Assessment. This approach could in turn lead to a measure of optimal acceptable tree cover for important landscapes, facilitating some of the aims of Rewilding and also help achieve the targets set out in the government's Forestry Policy Document.

The government has committed to increasing the woodland cover of the U.K. by 50% but over an unspecified time period to mitigate against climate change and to provide ecological corridors and havens. The government aspires to planting 10,000 ha/yr which will make significant impacts upon the landscape. *Such increases, however desirable in theory, will almost certainly involve at least local landscape transformations. There is the potential for damage to be done to historic*

features, treasured landscapes, and valuable open habitats, as happened in the past. However with goodwill on all sides it should be possible to raise our tree and woodland cover without raising the storm of protest that greeted afforestation in the 1970s and 1980s.' (Kirby, K.J., et al)

This study demonstrates that digitally altered photos are a legitimate tool for assessing landscape conservation options and is an approach that could foster goodwill through an analysis of perception and preference so that planting regimes can be optimised in terms of quantity, quality and public acceptability.

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