MSc Land and Ecological Restoration

Research Project

Perceptions of Nature – are we bewildered?

A social-ecological mixed-methods study in a UK National Park

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RESEARCH ARTICLE

PERCEPTIONS OF NATURE – ARE WE BEWILDERED?

A SOCIAL-ECOLOGICAL MIXED-METHODS STUDY IN A UK NATIONAL PARK

Maeve M. Leith

The word 'wilderness' serves as a formal term for the classification of protected landscapes globally and is frequently used to describe National Parks in the UK. This study investigated public definitions of 'wilderness', and the application of the term in relation to Dartmoor National Park in Devon, UK. Employing a mixed-methods questionnaire to gather data from residents and visitors to Dartmoor (n=124), the findings revealed the presence of an "Ideal Wilderness Perception" group among both visitors to and residents of Dartmoor, who view the Park as largely free from human impact, despite its deep history of human interaction. Visitors were much more likely to be in the "Ideal Wilderness Perception" group, and visitors also exhibited seemingly paradoxical values regarding access to 'wilderness' alongside a perception of wilderness as lacking in human impact. Given that National Parks in the UK are not formally designated as wilderness and are shaped by human activity, the study highlights the duality of the term 'wilderness' as both a formal classification and a subjective human experience, reflecting a broader conflict in human-nature relationships between the idealised concept of wilderness and its formal definition. This research underscores the complexity of landscape perceptions and experiences of stakeholders within the context of social-ecological systems such as UK National Parks.

Key words: wilderness, National Park, perception, terminology, stakeholder, human-nature

Implications for practice

- Practitioners to use caution when using the terminology of "wilderness", making sure to clearly define what is meant by the term each time.
- National Park land stewards to consider an information campaign for a specific subsection of stakeholders who perceive the landscape to be 'pristine', or 'lacking in human impact'.
- Project partners to consider co-constructing a context-specific glossary of terms at the outset of a project, with all stakeholders included in the process.

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1. Introduction

1.1 Dartmoor National Park

Dartmoor National Park (DNP) covers 954 km^2 of mostly rough-grazed moorland in South Devon, UK (**Fig. 1**). It is one of ten areas in England protected by The National Parks and Access to the Countryside Act 1949 (UK Gov, 2019), which aims to safeguard public access to open countryside and conserve nature and natural beauty. People have lived and worked within DNP boundaries since the Bronze Age around 4,500 years ago (DNPA, 2017a), and today 86% of the National Park is defined as utilisable agricultural area (UK Gov., 2024). 34,000 people live within the National Park limits, and DNP is visited by approximately 2.5 million people every year (DNPA 2024).

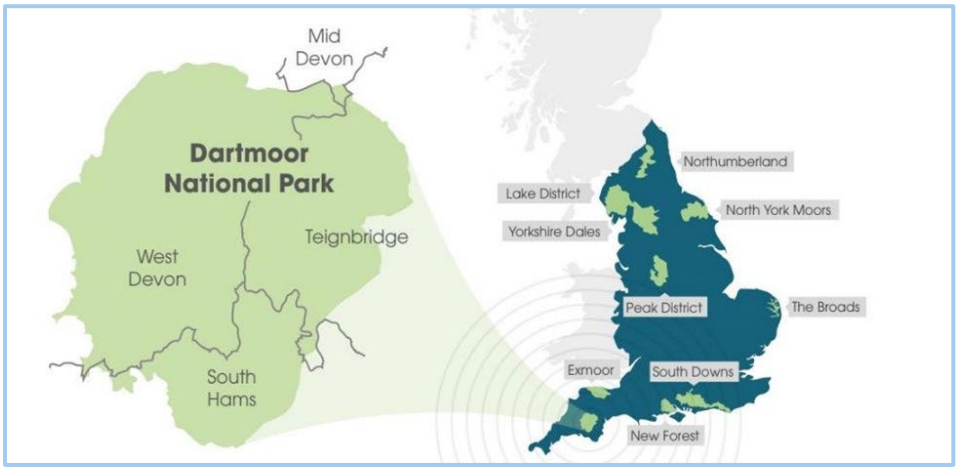

Figure 1: Map of study site
The site of this research was Dartmoor National Park in South Devon, UK, which the map highlights in the inset, showing its geographical context among ten other National Parks in England (image source: Your Dartmoor, 2021).

1.2 Perception as a 'wilderness'

The Dartmoor National Park Authority (DNPA) recognises that many people perceive the landscape of Dartmoor as a 'natural wilderness' (DNPA, 2017b), and this perception is reflected in popular media, such as in a recent BBC call-out for reader photographs (**Fig 2**). The term also featured prominently in the title of a recent documentary about Dartmoor, *WILDERNESS: The wounding of England's last great wild spaces*, distributed by the ENDS Report, which describes itself as the "UK's No 1 source of intelligence for environmental

professionals" (ENDS Report, 2023), suggesting that the notion of Dartmoor as a wilderness extends into the environmental sector. Similarly, the non-fiction book *Dartmoor: Into the Wilderness* refers to Dartmoor as '*a wilderness untamed'*, while at the same time acknowledging that humans have lived and worked on Dartmoor since prehistoric times (Dibb, 2011). From a sociological perspective, Smith et al. (2018) note that in the UK, "*representations of wilderness areas are commonly matched to remote, wild moorlands (e.g. Dartmoor), which are widely viewed as places 'unspoiled' by human activity, and where wildlife and nature are perceived to survive and flourish*." As pointed out by Zoderer and Tasser (2021), wilderness attitudes are significantly influenced by general wilderness representations, and Saarinen (2018) highlighted that the potential impacts of protected landscapes being represented without the presence of humans could be challenging for the relationship between protected area management and tourism. This perception of National Parks as a type of 'wilderness' could also extend into local communities, as Méténier (2020) found that when recently arrived residents were asked, "*For you, what is Dartmoor National Park?*", one of the four major themes in responses was "*attraction to the wilderness*." Additionally, Tatum et al. (2017), examining landscape aesthetics and housing in UK National Parks, observed that the popular imagination closely associates wilderness with the concept of National Parks.

Figure 2: Dartmoor – the last wilderness in southern England
This photograph describes Dartmoor as "the last wilderness in southern England" (source: BBC, 2024), and sparked the central research question for this study: what does *wilderness* mean in reference to Dartmoor's landscape as perceived by the public?

1.3 Definitions of wilderness

Ecological definitions

The term wilderness as an ecological classification for landscapes originated in the United States, the first country to legally define and protect 'wilderness areas' through The Wilderness Act of 1964 (Massip, 2020). The use of this classification has received criticism as an inappropriate and dehumanising concept (Cronon, 1996; Fletcher et al., 2021), essentially separating humans from nature, however Swart et al. (2001) regarded 'pristine ecosystems' or 'real nature' as an important reference point for restoration efforts, and according to Kelly and Landres (2023), the original purpose of wilderness classification was to safeguard landscapes from human settlement, and they argue that it remains relevant today. The International Union

for Conservation of Nature (IUCN, n.d.) uses seven landscape classifications today (**Fig.3**), and category Ib (wilderness area) is defined as a "*usually large unmodified or slightly modified area, retaining natural character and influence, without permanent or significant human habitation, protected and managed to preserve natural condition*" (Dudley, 2008).

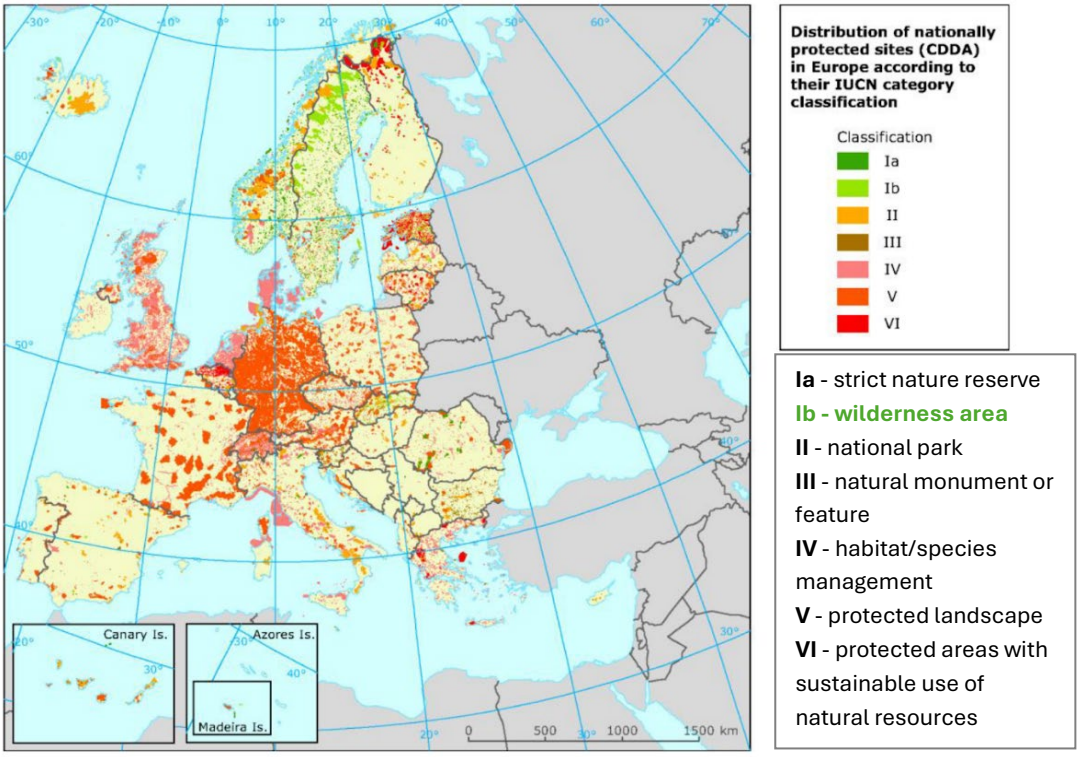

Figure 3: Map of the IUCN protected sites in Europe
This map shows the distribution of nationally protected areas in Europe according to their IUCN category. England has protected areas designated under IUCN categories IV and V only, and DNP itself is category V – a protected landscape (EEA, 2012).

1.4 Other definitions of wilderness

The feeling of wilderness

Human wellbeing benefits from cultural ecosystem services (CES) (Hausmann et al., 2015; Hasan et al., 2020) such as 'sense-of-place', which are becoming more important in the context of rising urbanisation (Schnitzler, 2014; Wartmann et al., 2018). A person's sense-of-place, or how they feel attached to a landscape, is made up of their personal feelings and perceptions (Masterson et al., 2017), and the perception of 'wilderness' may vary from person to person. For example, feelings of solitude and tranquillity are important CES (Carver et al., 2002), but the *feeling* of wilderness may have nothing to do with an ecological classification of

wilderness. The potential impact on CES, including sense-of-place, of land management interventions has not yet been thoroughly researched (Fitzgerald et al., 2021), and as Ólafsdóttir et al. (2020) demonstrated, multiple meanings can be attributed to a landscape, depending for example on an individual's knowledge of the area, although their study did point to a unified experience of '*tranquillity and quietude'* being strongly associated with the idea of wilderness. As stated by Bauer & von Atzigen (2019)*: "it often remains unclear what the public means exactly by the word wilderness".*

The *appearance* of wilderness

Landscapes can potentially fulfil the function of feeling like a wilderness by *appearing* to be lacking in human impact (Pheasant and Watts, 2015). This purely visual attribute of wilderness was acknowledged in the original Wilderness Act in1964: *"…generally* appears *to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable"*, as well as in a more modern definition from the National Wilderness Institute, whose 'wilderness value' measurement includes: "Apparent Naturalness*, which is a measure of how "wild" or "undeveloped" an area might* seem *to a visitor*" (Hawes et al., 2015). If visitors are primed to see DNP as a wilderness by popular media, they may not question the definition of the term when it is used as an ecological classification and therefore could overlay DNP with impressions from that definition (Stedman, 2003), including an apparent lack of 'man's work'. DNP is not classified ecologically as a wilderness, it is an IUCN category V (see **Fig 3**): "*where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated values*" (Dudley, 2008). However, when placed upon a 'spectrum of wilderness' within the UK, parts of DNP, such as the moorland, can be identified as some of the 'wildest' landscapes within British boundaries (Carver et al., 2002), therefore offering important cultural experiences of wilderness attributes, such as solitude and remoteness. Deary (2016) wrote of the 'paradox' of landscapes considered wild when they are products of human civilisation, and they point to an opportunity for reconciling cultural and wilderness values for future landscape restoration.

1.5 Use of terminology

The use of language in the dissemination of information between the ecological community and other sectors is the subject of ongoing discussion. The term 'rewilding' recently received criticism within scientific discourse due to the 'fuzziness' of existing definitions which can prevent scientific messages from being accurately translated into practice (Hayward et al., 2019), and due to the diversity of perceptions involved, it has been argued that the imprecision of the term 'rewilding' allows people to appropriate it and mould it to conform to their own values (Deary and Warren, 2017). Defining the term 'ecosystem service' has also proven a challenge and problems pertaining to this terminology have affected the public acceptance and understanding of the concept (Nahlik et al., 2012). Varying perceptions and definitions can mean different starting points for stakeholders involved, which can affect project decision-making (Stenseke et al., 2020).

Ecological literacy

There is general agreement in recent literature that increasing ecological knowledge in the public is an important and necessary thing for society (Pitman et al., 2016; Hilmi et al., 2021; Koyama and Watanabe, 2023), and low levels of ecological knowledge in a population have been shown to make it harder to build broad-based support for biodiversity conservation (Hooykass et al., 2019). Evidence suggests that poor perceptions and lack of knowledge about a particular species may hinder local conservation efforts, and that integrating perception data with scientific knowledge to inform conservation decision-making is critical (Lawer et al., 2024). The promotion of species knowledge in school has been acknowledged as a measure to improve the attitudes of students regarding the environment (Härtel, et al 2023) and increased understanding of a local landscape's natural systems was identified as a key step to increasing ecological literacy, and therefore implications for citizenship and general human responsibility (Pitman et al, 2020). More research could be done on the connection of language-use to public acceptance of, and therefore the successful implementation of, landscape management (Webb and Raffaelli, 2008), and Jordan et al. (2009) asserted that there is a need to consider a framework to achieve more ecological literacy across society.

Conflicting terms

It has been demonstrated that different ways of framing the same issue can impact public

opinion (Hart & Larson, 2014), and Zoderer et al. (2020) identified disparities specifically between public wilderness definitions and expert-based wilderness definitions, indicating areas where differing definitions could result in management conflicts, and expressing concern that the term wilderness is likely to be ambiguous. This could indicate the need for what Hull & Robertson (2000) called a 'public ecology', or more accessible and inclusive terminology, as the will to participate in productive dialogue can be stifled when stakeholders do not have a meaningful language to use. Hodges (2008) however argues that prescribing terminology does not work, and that it is ineffective to urge people to use only one or a few definitions, while Herrando-Pérez et al. (2014) argue for a '*convention of ecological nomenclature',* asserting that terminology within academic discourse is frequently hindered by ambiguity, which impedes the progress of ecology, and they suggest language uncertainty will transfer to policymaking, management, and planning. Zoderer and Tasser (2021) recommend that projects begin with the identification and investigation of the wilderness beliefs held by all relevant stakeholders.

Conflicting values

'Wilderness' as a construct can represent a paradox of values, as people both want access to wilderness as an experience and want wilderness to be left alone by people (Bauer, 2005; Vining et al., 2008; Bishop et al., 2022). There has been an increase in studies on visitors' valuation of nature in protected areas over the last decade (Gross et al., 2023), and differing values regarding wilderness have been the subject of environmental research for decades (Saarinen, 2015), long acknowledging a paradox that exists in nature perception: it is at once treasured and at the same time exploited (Cooper, 2000; Sæþórsdóttir, 2013; Saarinen, 2018). Representations of the 'wild' for tourist consumption reproduce both images of 'pristine nature', as well as the idea of an 'empty space' where various recreational activities can take place (Saarinen, 2018; Bishop et al., 2022); depictions that commodify 'wilderness' and can exclude local communities from public imagination (Saarinen, 2018). In a survey on attitudes to wilderness, 90.8% of the respondents (a representative sample of a nation's residents) understood wilderness to refer to areas still untouched by human influence and highlighted a perception discrepancy between ideal images of wilderness and existing wilderness. (Bauer, 2009).

1.6 Importance of this research

There is a growing consideration of the influence of social systems on environmental outcomes, as well as the influence of the perceptions of the proposed environmental interventions (Titus et al., 2024). A 2023 independent review into land management in DNP stated: "*The way Dartmoor is managed needs to change radically and urgently. We encourage people to come together to produce a shared vision for the future and how to get there. Clearly this process involves a wide range of stakeholders with a vested interest in the future of Dartmoor*" (UK Gov., 2024). Public understanding of the term 'wilderness' in the context of UK National Parks has not been investigated, and if there is a conflict of definitions when it comes to this important cultural landscape, this could indicate an area of focus for education and outreach. Recent nature perception research has focused less on Europe, and there are calls for context-sensitive studies on perceptions of protected areas with the inclusion of more stakeholder groups alongside visitors, such as local communities (Gross et al., 2023; Saarinen, 2018). A deeper understanding of how places specifically labelled as "wilderness" are perceived and valued has been deemed crucial for addressing the interests of various stakeholders who use or live near these areas, and for achieving broad acceptance of nature conservation and restoration efforts (Lupp et al., 2011). There are many stakeholders with different levels and types of investment in DNP, and tourism is a significant economic contributor, generating an estimated £144.5 million from 2.39 million visitors annually (DNPA, 2018). Visitor perception information is essential for justifying, implementing, and evaluating management actions aimed at protecting natural resources and ensuring visitor satisfaction (Vistad et al., 2012) and to gain a comprehensive understanding of the social and cultural aspects of landscapes, it is also important to consider the perspectives of residents (Fitzgerald et al., 2021). Using DNP as a setting where different uses and understandings of the same term could foster miscommunication, this study aims to evaluate whether the term is being used differently by two key stakeholder groups of DNP.

2. Primary aim

To determine if differences exist in definitions of the term 'wilderness' in relation to perceptions of the landscape of Dartmoor, as stated by visitors to and residents of DNP.

2.1 Objectives

1. To collect definitions of ‘wilderness’ from visitors to and residents of DNP.
2. To collect perceptions of the landscape of Dartmoor in relation to their definition of ‘wilderness’ from those visitors and residents.
3. To compare the public (visitor and resident) definitions and perceptions of ‘wilderness’ and Dartmoor with ecological classifications of ‘wilderness’ and Dartmoor.
4. To determine whether a knowledge or communication gap exists between these public stakeholder groups, as well as between the public and the ecological community.

2.2 Central hypothesis

The definitions of ‘wilderness’ and perceptions of Dartmoor are significantly different between two stakeholder groups, Residents and Visitors. This is a two-tailed hypothesis, with no prediction of the direction of difference.

The null hypothesis is that there is no clear differentiation between definitions of ‘wilderness’ and perceptions of Dartmoor between these two stakeholder groups.

3. Methods

This study used a short mixed-methods questionnaire with ten quantitative Likert-scale questions adapted from Bauer (2009) to assess general attitudes toward nature (see Appendix A), as well as three qualitative open-ended questions focused specifically on Dartmoor's landscape (Zimmerman et al., 2007; Stantcheva, 2023). Mixed methods questionnaires can offer comprehensive insights within a limited timeframe (Heale and Forbes, 2013; Mertens & Hesse-Biber, 2012; Lieber, 2009) and are useful for exploring respondents' thought processes through open-ended questions (White et al., 2005). However, they can be challenging for novice researchers (Dawadi et al., 2021), particularly regarding data integration and analysis (Taherdoost, 2022). Shorter questionnaires can increase response rates (Bowling, 2005; Jaeger & Cardello, 2022) but can omit pertinent variables (Sharma, 2022). Data collection for this study involved active face-to-face distribution of paper questionnaires (Manohar et al., 2018; Walgrave & Verhulst, 2011), which can enhance participant rapport and response quality (Stantcheva, 2023; Jaeger & Cardello, 2022) but may introduce selection bias (Rubenstein &

Furnier, 2020). Using convenience sampling (Stratton, 2021) and purposive sampling (Andrade, 2021) for both site and respondent, along with online voluntary response sampling (Kılınç & Fırat, 2017), and aiming for 75 responses (Fugard & Potts, 2014), the study targeted a broad cross-section of Dartmoor visitors at six sites (see Appendix B) over 11 days, selecting locations based on volume and the diversity of users (DNPA, 2024). Both convenience and purposive sampling are efficient (Campbell et al., 2020) but may affect external validity and introduce selection bias (Andrade, 2021). Researcher bias, influenced by the researcher's own residence in DNP, was minimised by using self-administered questionnaires to reduce social desirability (Stantcheva, 2023) and interviewer influence (Queirós et al., 2017; Neuman, 2012), however this method can lack depth and fail to capture emotional changes when compared to long-form interviews (White et al., 2005). The study followed a critical realist epistemology (Maxwell & Mittapalli, 2010), blending empiricism and constructivism (Berger, 2015), and was guided by pragmatism in method choice and analysis (Moon et al., 2016). Ethical considerations were addressed with anonymous surveys, voluntary participation, exclusion of under-18s, verbal consent, and participants received information forms with an option to withdraw at any time (see Appendix C), ensuring minimal information risks.

3.1 Pilot survey

A pilot study was undertaken at the event *Nature Restoration on Dartmoor* in February (Ashburton Arts, 2024). 150 questionnaires were handed out at this event, and 86 were returned. After this pilot, based on written and verbal feedback, the Likert-scale questions were re-worded for clarity and context, and the open-ended questions were added, combining both quantitative data collection to provide statistically valid results, and qualitative to allow more meaningful exploration of complex ideas and attitudes (Swanwick, 2009).

3.2 Methods of analysis

Missing data

21 questionnaires were excluded due to missing more than 20% of quantitative data or lacking responses to one or more open-ended questions, as this could significantly affect results (Hair et al., 2010). For surveys with less than 20% missing Likert-scale data, median imputation was

applied to address item non-responses (Stantcheva, 2023; Hair et al., 2010; Graham, 2009).

Mixed-method thematic analysis

Word clouds were created, removing function words and adjusting word size based on frequency (Stantcheva, 2023), for an initial qualitative overview of responses. Further analysis consisted of inductive thematic analysis, which allows themes to be iteratively identified from qualitative data and be quantified (Ainsworth et al., 2020; Webb & Raffaelli, 2008; Proudfoot, 2022), as well as deductive thematic analysis, which identifies themes from prior literature to be sought out in the new data (Leung et al., 2021). Directive comparative content analysis (Zimmerman et al., 2007; Hall & Steiner, 2020) was used, using a 1-10 rating scale to quantify qualitative data (Webb & Raffaelli, 2008). Responses were categorised, compared (Bolaños-Valencia et al., 2019; Bow et al., 2004; Pinault et al., 2020), and coded (Webb and Raffaelli, 2008) by the author for internal consistency, with a sample reviewed, discussed and agreed upon with a colleague and fellow ecological restoration practitioner (J. Comerford) for triangulation, reducing bias and increasing robustness (Webb & Raffaelli, 2008; Buijs, 2009). Non-parametric tests were used for statistical significance due to non-normal data distribution, even after log transformation (Harpe, 2015). The medians of the coded responses were tested for difference using the Mann-Whitney U test in PAST.exe, and Joint Display Analysis was used to integrate qualitative and quantitative results (Haynes-Brown & Fetters, 2021).

Quantitative analysis

The quantitative section of the questionnaire, the Likert-scale questions, were adapted from Bauer (2009), who identified four distinct attitudes towards nature using Ward's minimum variance cluster method in a sample of a European nation's residents. This same analysis was applied to this study's data from DNP visitors and residents. Single Likert-scale questions were also compared to explore nuances in nature values (Derrick & White, 2017; Willits & Luloff, 2016), and medians were tested for difference using the Mann-Whitney U test in PAST.exe. The respondents were split into groups of residents (n=61) and visitors (n=63), and the effect size for these samples was calculated in PAST.exe and using Cohen's r (Gignac & Szodorai, 2016), and a post-hoc power analysis in G*Power (Kang, 2021) was performed.

4. Results

Respondents

163 people were approached in person, 132 of which agreed (81%), and 31 of which declined (19%). 13 responses were received from the online survey. In total 145 responses were collected, and after missing data omission, 124 responses were included in the analysis: 61 Residents and 63 Visitors.

Population representativeness

The data collection process, which spanned over two months, yielded a diverse set of responses from a broad cross-section of participants (**Fig.4**). There were however some discrepancies compared to previous DNPA visitor surveys, notably almost double the number of respondents age 65+ compared to a DNPA (2024) survey, and an overrepresentation of male residents age 65+ compared to census data (ONS, 2021) (see Appendix D). Additionally, the effect size and the sample size were both small and revealed to have low power (Giner-Sorolla et al., 2024) (**Table 1**).

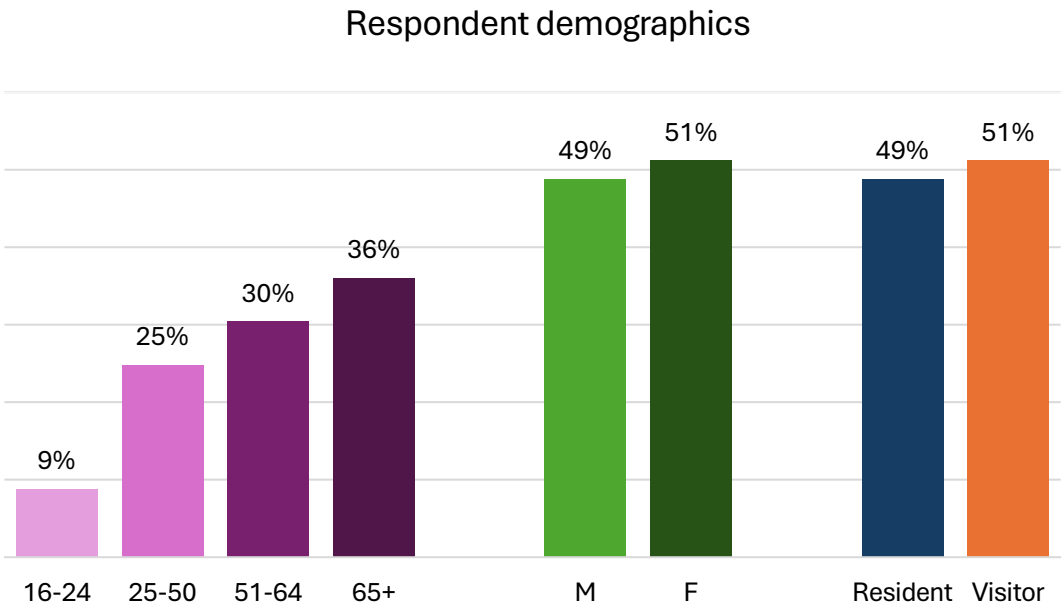

Figure 4: Respondent demographics
This graph gives a breakdown of the ages, genders and research interest stakeholder groups (Resident and Visitor) of the 124 respondents included in the research.

Table 1: Sample power
Based on the post-hoc power analysis, both the effect size and power of this sample are considered small.

Parameter	Value
Effect size	**0.208**
Sample group 1 (Residents)	61
Sample group 2 (Visitors)	63
Alpha error probability (α)	0.05
Power (1 - β)	**0.2021170**

4.2 Important traits of Dartmoor

The words people use

The three open-ended questions allowed for the collection of longer-form written responses, and to explore which words were used most frequently in the responses to the open-ended question, "*What traits, features and characteristics of Dartmoor make it important to you?*", a word-cloud offers a broad qualitative visual advantage (**Fig.5**). The size of the word indicates how often it was used across all responses. Although "wild" and "wildness" appear visibly large, the word "wilderness" was only mentioned seven times (compared to 27 times for "tors") and is not immediately visible. However, when all the words that could be included in a *theme* of wilderness were summed (unspoilt, wilderness, wild, wildlife, wildness and natural), the mentions were almost double the number of the top word "tors". The word-cloud generated by the responses collected by this study can be compared with a word-cloud of responses (**Fig.6**) to a 2012 DNPA visitor survey question: "*What is special to you about Dartmoor?*". The 2012 report also listed the words that were most used by visitors in order of frequency (**Table 2**), which allowed for a comparative thematic evaluation of which words have stayed consistent over more than a decade when people are describing what is special or important to them about Dartmoor. The top three words mentioned in 2012 and 2024 both included "open" and variations of "wild", while 2012's third most popular word was "space", and in 2024 the word that took first place was "tors". The question in this study specifically mentioned 'features', thereby increasing the likelihood of physical attributes being mentioned, and this was the main difference between the two word-clouds. The themes apparent in both word clouds seem

consistent across the years: **wildness**, **vastness**, **aesthetics**, **access** and **tranquillity** all feature in both sets of responses. There is no publicly available demographic information about the DNPA 2012 survey respondents for comparison.

Figure 5: Word cloud 2024
This word cloud is made up of the responses to the open-ended question in this study: "What traits, features and characteristics of Dartmoor make it important to you?". The bigger the word, the more it was mentioned.

Figure 6: Word cloud 2012
A visitor survey taken 12 years ago (DNPA, 2012) asked visitors "*What is special to you about Dartmoor?*" and DNPA published this word-cloud of the responses. There are some interesting similarities and differences between the two word-clouds (**Table 2**).

Table 2: Word cloud comparison
Comparison of the two word-clouds offers some broad insights into similarities and differences across the two surveys. This table shows the top word lists side by side, colour matched by similar theme.

DNPA survey (2012) "*What is special to you about Dartmoor?*" **Top 9 words**		**This study (2024)** "*What traits, features and characteristics of Dartmoor make it important to you?*" **Top 9 words**
Wild/wilderness	1	Tors
Space	2	Wild/wildness
Open	3	Open
Beauty	4	Landscape
Freedom	5	Rivers
Landscape	6	Views
Tranquillity	7	Walk
Access	8	Access
Natural	9	Peace
The top three words were "wilderness", "space" and "openness" indicating a **focus on the experiential aspects of nature.**		The top three words were "tors," "wildness," and "open," **indicating a specific landscape feature focus**.

The themes within responses

Thematic analysis can further allow for the identification of meanings of words and phrases that may not be apparent in simply summing up words used in a word-cloud, as some words may be used negatively i.e. "Dartmoor is not a wilderness". The same written responses to the question, "*What traits, features and characteristics of Dartmoor make it important to you?*" were analysed, 17 themes were identified by inductive thematic analysis (Ainsworth et al., 2020) and the mentions of them were summed and converted to a percentage of the total amount of comments around the themes (see Appendix E). The top themes were **landscape features** and **habitats**, with **vastness** and **solitude** coming joint third (**Table 3**). The theme of **pristineness** (synonymous with 'lack of human impact') ranked 15 out of 17; however,

variations of the actual word **wild** came in at ten. **Aesthetics**, **recreation** and **access** all featured in the top ten, and **human communities** and **agricultural practices** featured higher than **pristineness** at numbers 12 and 13. The themes are broadly similar to what the word-cloud picked up as important to those people that visit and live in DNP.

Table 3*: "What traits, features and characteristics of Dartmoor make it important to you?": all themes*
The table shows the 17 themes identified by thematic analysis in the responses, with the top four, plus **pristineness/lack of human impact** highlighted, along with examples of the words and phrases used to identify the theme.

Top themes	Examples of the words and phrases identified representing the theme	Percent
1. **Landscape features**	*Tors, rivers, geology, valleys, hills, open countryside, "personality of the area", barrenness, uniqueness, ruggedness, landscape.*	**17%**
2. **Habitats**	*Woodlands, moors, heath, bogs, marshes, temperate rainforest, fields, nature, "varied", 'flora and fauna', "diversity", "different areas", wildlife haven, nature-rich areas, hay meadows, scrub.*	**11%**
3. **Vastness**	*Wide open, walk for hours, space, size of area, remoteness, expansive, big, barren vistas, places inaccessible, desolation, huge, wide, large, immerse, scale, high.*	**9%**
4. **Solitude**	*Peace, tranquility, quiet, empty, freedom, walk for hours without seeing others, escape, emptiness, a feeling of remoteness, serenity, calming sounds, desolation, natural sounds.*	**9%**
Other themes in order of frequency		
5. Aesthetics	12. Human communities	
6. Biodiversity	13. Farming/ grazing	
7. Recreation	14. Lack of modern human habitation	
8. Access	15. **Pristineness/lack of human impact** - *Un-spoilt, natural, left to nature, unchanged, keeps to its natural state, untouched, "real", "true", the landscape belongs to itself.*	
9. History and stories	16. Clean air/water	
10. Variations on the word "wild"	17. Spiritual	
11. Roaming animals		

Themes: Visitors compared to Residents

Responses were then split into Residents and Visitors using postcode information (Bell, 2024) and the 17 themes were summed within the separate groups for comparison (**Fig.7**).

Landscape features were once again the top theme mentioned by both groups, however there was a large split over the second most mentioned theme, with **habitats** a close second for Residents, whereas Visitors mentioned **solitude** and **vastness** as almost joint second. Although **pristineness/lack of human impact** was not mentioned much by either group, Visitors were much more likely to mention it as important, and Residents were much more likely to mention the **historical** and **cultural** aspects of Dartmoor.

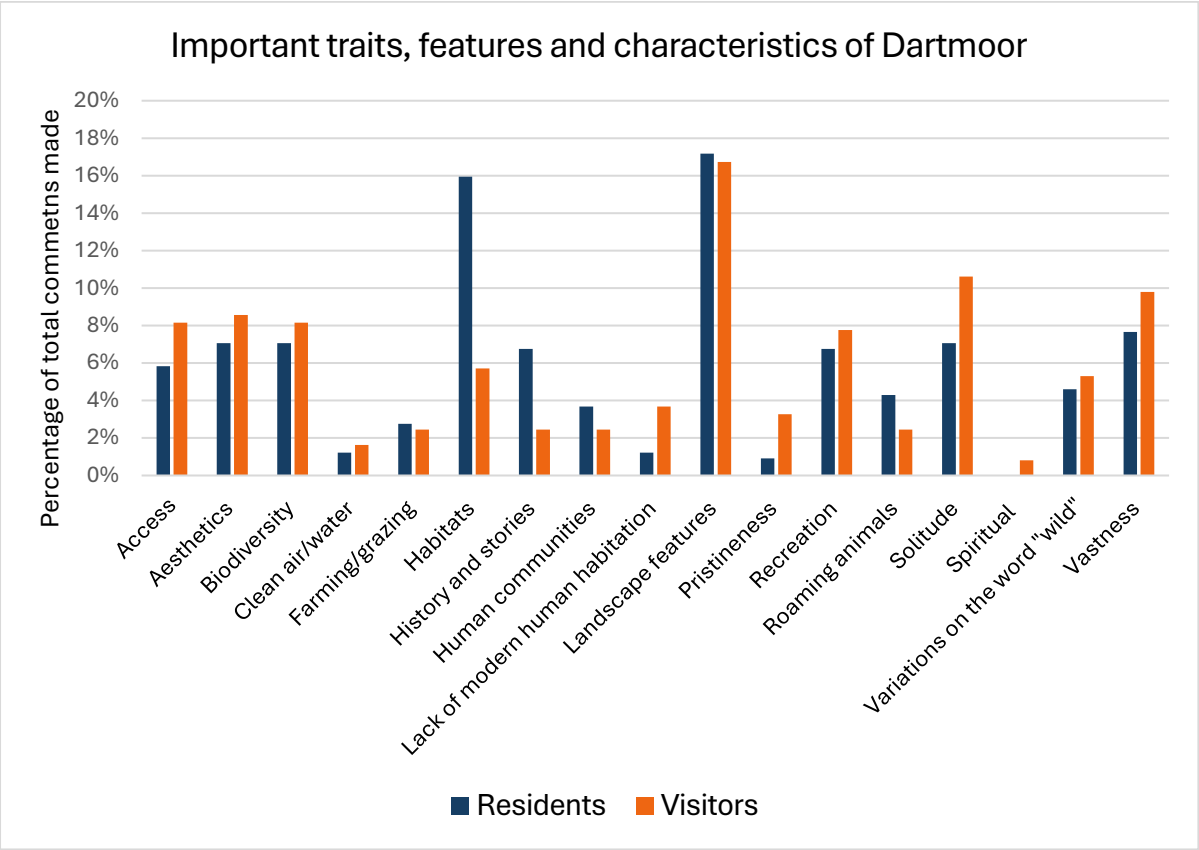

Figure 7: "*What traits, features and characteristics of Dartmoor make it important to you?*": themes
All 17 themes identified and divided into Residents and Visitors for comparison.

4.3 Wilderness Definitions

Themes in formal classifications

Landres et al. (2008) conducted a study of international wilderness laws, finding that 11 countries have enacted legislation related to ecological wilderness definitions, to protect wilderness areas. Of these, nine provided detailed definitions, and when combined with definitions from two other global organisations, several common themes emerge (Appendix F).

The theme that this study identified in all 11 international ecological definitions of wilderness is **lack of human influence**, with **large size** and **natural character** coming in joint second.

Themes in public definitions

The responses to the open-ended question *"What is your definition of the term 'wilderness'?"* were also inductively analysed for themes and 10 themes were identified in total (**Fig.8**). The results show that the theme **lack of human influence** was also most identified within the public definitions of wilderness. There is also some crossover with the themes identified as important traits of Dartmoor, such as **solitude**, **vastness**, **aesthetics** and **access.** Two themes in wilderness definitions that differed from the important traits were **remoteness/hard to access** and the **unknown/unexplored**.

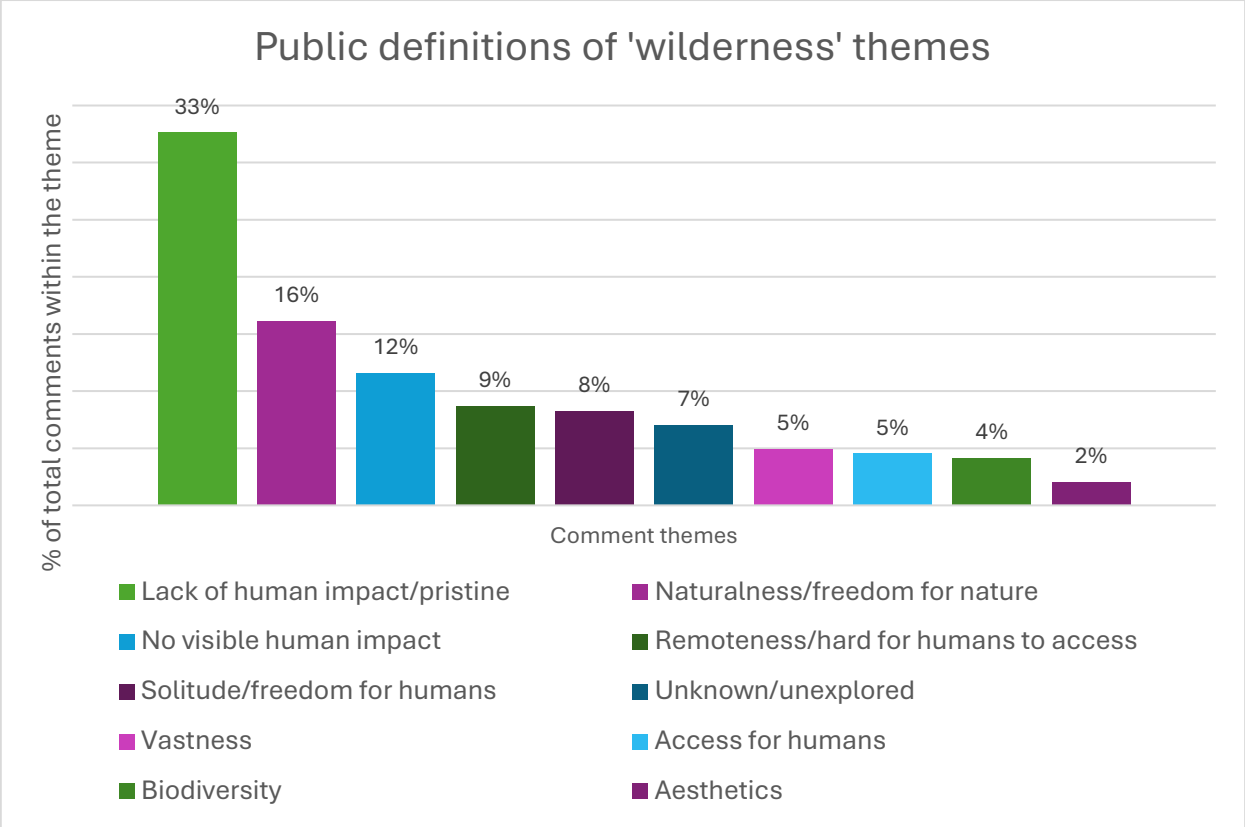

Figure 8: ***"What is your definition of the term 'wilderness'?": themes***
A bar chart showing the distribution of 10 themes inductively identified within responses.

4.4 Comparisons of themes in 'Wilderness' definitions

Public versus formal

To compare public and formal definitions, the responses were analysed again deductively (Leung et al., 2021) starting with six themes found in the formal definitions (see Appendix G). There is indication that while a similar value is placed upon **lack of human impact**, there are some differences. An **aesthetic** theme was top of the list in public definitions, indicated (**Fig.9**) by the higher identification of the **naturalness** theme, and **remoteness** was more important to the public, while **vastness** and **biodiversity** were mentioned much less.

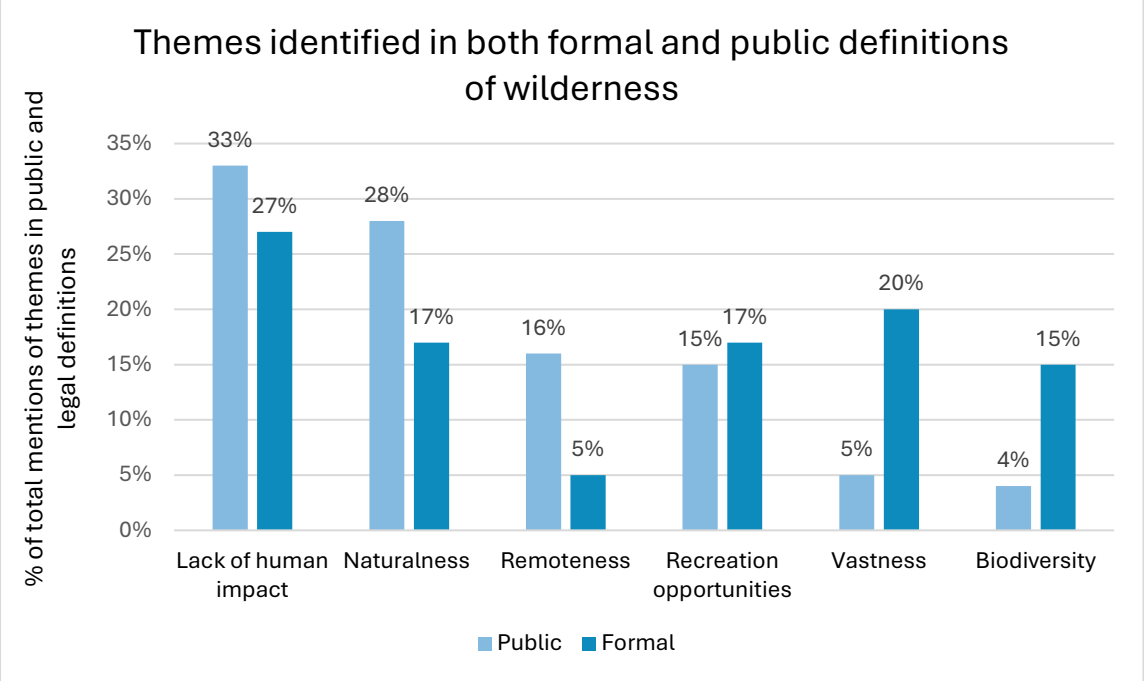

Figure 9: Formal versus public wilderness definitions
This bar chart comparison highlights the differences and similarities between public perceptions and formal ecological definitions.

The public definitions of wilderness were then compared with the formal using directive content analysis (Zimmerman et al., 2007; Hall & Steiner, 2020), with a focus on the most prevalent formal classifications' theme **lack of human impact**, using a 1-10 rating scale to quantify qualitative data (Webb and Raffaelli, 2008) based on their emphasis of the theme **lack of human impact**, and emphasis levels were coded as high (7-10), moderate (4-6), and low (1-

3) (Webb and Raffaelli, 2008) (**Table 4**).

Table 4: *"What is your definition of the term 'wilderness'?": examples and coding*
The table shows examples of written responses, as well as showing how that response was coded for containing a low, moderate or high emphasis on the consistent ecological theme **lack of human impact**.

	Public definition of wilderness example	**How much *'lack of human impact'* is emphasised, out of 10.**
Survey 143	*"Freedom. Nature. Unknown."*	Low (1-3)
Survey 189	*"I imagine 'wilderness' to be an open area probably devoid of trees, and parts of Dartmoor I would describe as wilderness but the wooded valleys I wouldn't."*	Low (1-3)
Survey 152	*"Untouched plants, wild animals, fascination when strolling through the area."*	Moderate (4-6)
Survey 206	*"I suppose I think it means wild. Without much human inhabitation and areas that animals are often found without fences. I also associate it with harsh weather conditions."*	Moderate (4-6)
Survey 225	*"Where humans have not interfered with nature. Where there can be a range of wildlife. Large area with few roads."*	High (7-9)
Survey 98	*"Free from human / or unnatural intervention. Nature's domain."*	High (7-9)

Definitions that highly emphasise **lack of human impact** can be seen as aligned with a formal ecological classification of wilderness, as this was the only theme identified in every international wilderness definition for protected landscapes (Appendix F). When respondents had been coded for having a high, moderate or low emphasis on the theme lacking in human impact, it was possible to compare how many respondents' definitions of wilderness were aligned with this consistent ecological theme. A majority of all respondents aligned with an ecological definition, with Residents more likely to be highly aligned than Visitors, and Visitors were also more likely to have a definition of wilderness that aligned minimally with the

ecological landscape classification theme (**Fig.10**).

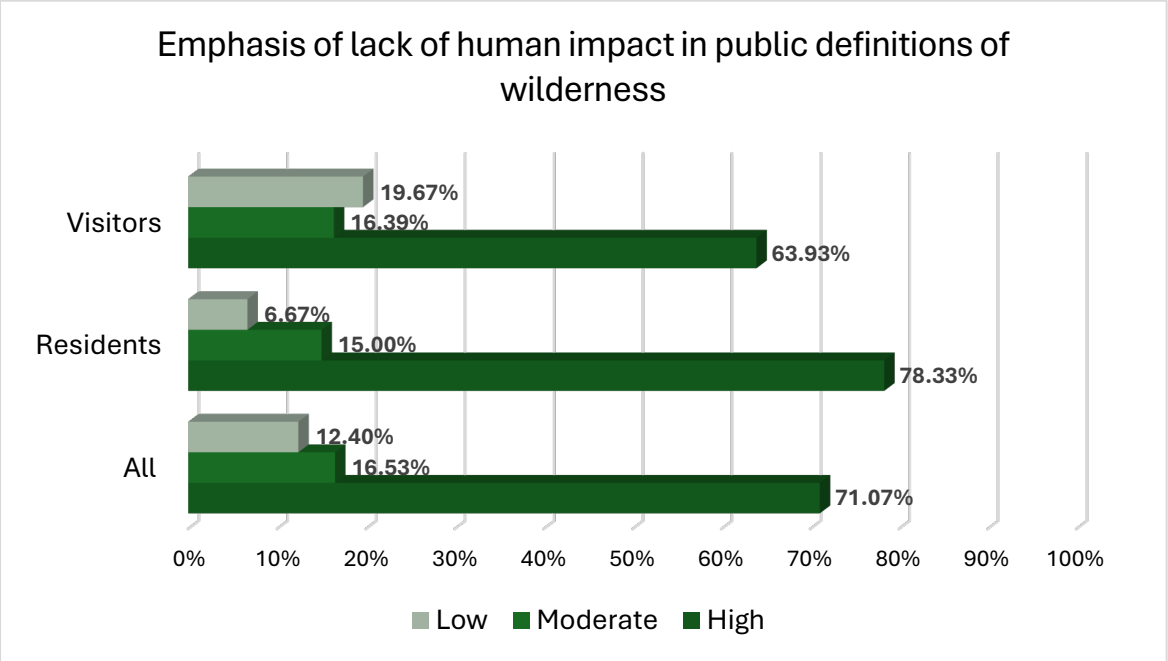

Figure 10: Public definitions coded for emphasis
The bar graph shows public wilderness definitions, coded to low, moderate or high for the emphasis on the consistent ecological theme **lack of human impact**, and the distribution of those across Visitor and Resident groups, as well as all respondents.

The coded scores were subsequently analysed for statistical significance. While efforts were made to minimise researcher bias during coding, it is acknowledged that this process carries inherent subjectivity, therefore, the results should be interpreted as indicative rather than conclusive, and further research is recommended. The Residents and Visitors had significantly different definitions of wilderness when considering an emphasis on lack of human impact (**Table 5**).

Table 5: Wilderness definitions tests for difference
This table presents the results of the Mann-Whitney U tests comparing the differences between Residents and Visitors in their emphasis on an ecological definition of wilderness. The table includes sample sizes, mean ranks, U-statistics, z-scores, and p-values, highlighting statistically significant differences between the two groups.

Comparison	Groups	Sample Size (N)	Mean Rank	Mann-Whitney U	z-Score	p-value (same median)
Emphasis on an ecological definition of wilderness	Residents	61	33.89	1531.5	1.9922	0.04635
	Visitors	63	28.60			

The responses regarding wilderness definitions were once again divided into the groups Residents and Visitors, and the themes compared. Residents were slightly more likely to mention the top theme **lack of human impact**, while Visitors were much more likely to mention an aesthetic version **lack of *visible* human impact**. Other differences included Residents being more likely to mention **remoteness** and the **unexplored** as themes within wilderness definitions, and Visitors being more likely to mention **biodiversity** and **accessibility**, while both groups mentioned **freedom for nature** with similar frequency (**Fig.11**).

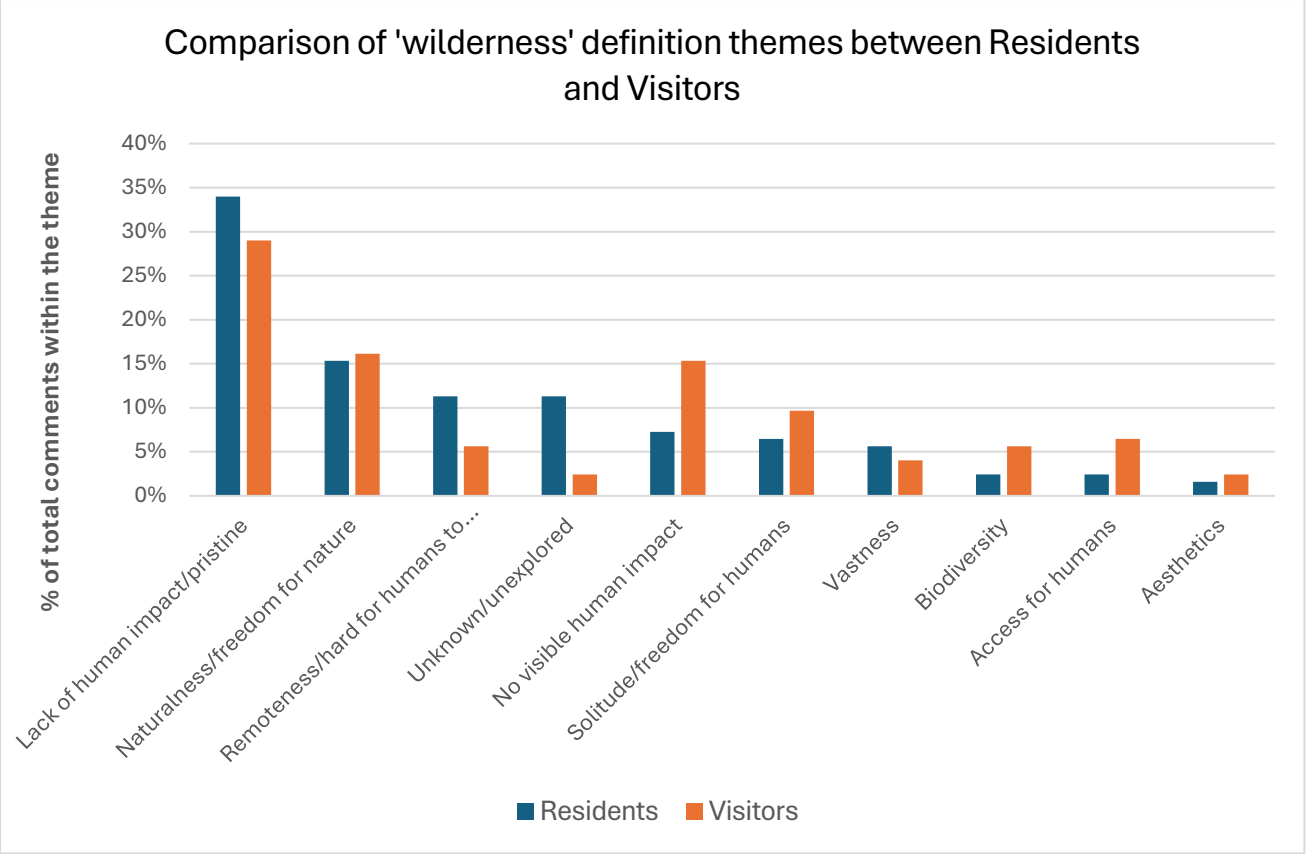

Figure 11: *"What is your definition of the term 'wilderness'?":* Residents versus Visitors, themes
The 10 themes identified in all respondents' wilderness definitions were compared between Residents and Visitors.

Themes in other definitions of 'Wilderness'

Of those definitions that did not emphasise the key ecological theme of **lack of human impact** (29% of all respondents), eight key themes were identified (in order of most mentioned):

1. Freedom and openness
2. Connection to nature
3. Remoteness and isolation
4. Minimal visible human impact
5. Natural beauty and scenic views
6. Coexistence with wildlife
7. Balance between natural and managed
8. The unknown and unpredictable

These eight themes could be further condensed into **aesthetics**, **feeling part of nature**,

solitude and **adventure** (**Fig. 12**), and they all exemplify human experience as integral to a definition of wilderness, contrasting with formal ecological classifications by prioritising the inclusion of humans into a construct of wilderness.

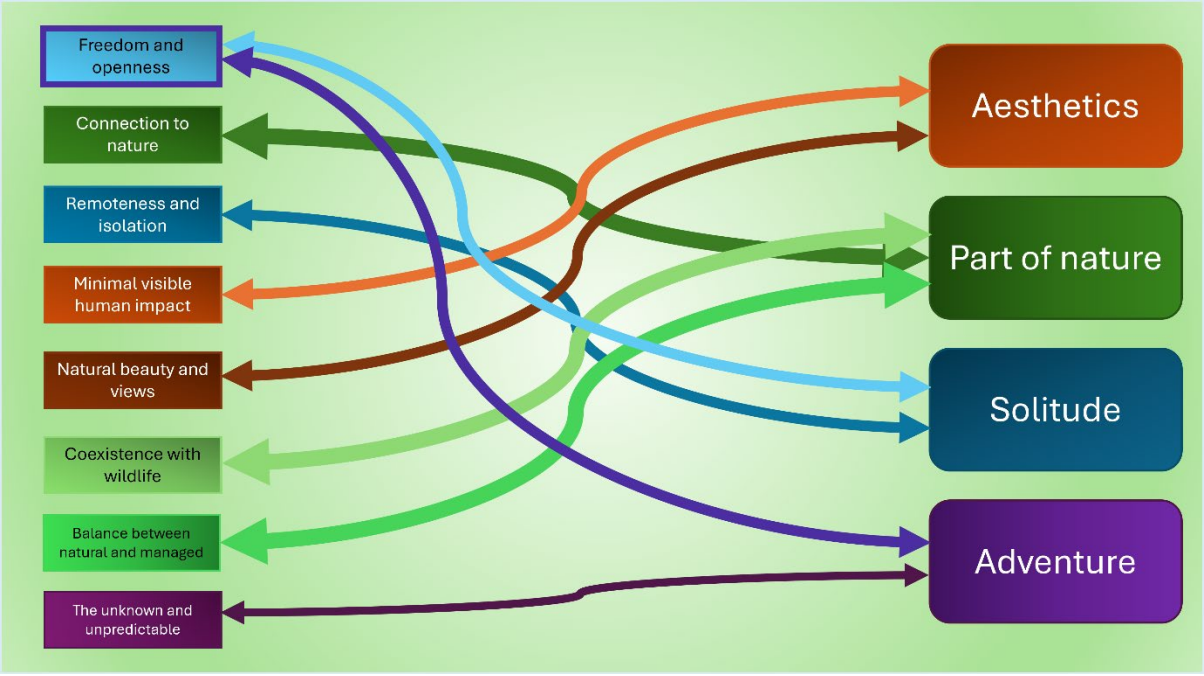

Figure 12: Themes in other wilderness definitions from respondents
In public definitions of wilderness that did not include **lack of human impact**, these eight themes were identified, which can be further condensed into four themes which highlight human experience as integral to these definitions.

Attitudes and values

The quantitative section of the questionnaire (Appendix A) was a series of Likert-scale questions designed to analyse attitudes to nature in general, by clustering responses into types based on what is valued about nature, and Bauer (2009) used it to identify four clusters within the population of residents of Switzerland (**Table 6**). Cluster analysis is an exploratory tool, and interpretation should be cautious (Buijs, 2009), however Wards Minimum Variance analysis, such as used in Bauer's 2009 paper, performed on the Likert-scale responses for this study did reveal two clusters (Appendix H), with very close to significant difference (Mann-Whitney U: p-0.053). These two clusters were then tested for significance difference against Bauer's (2009) four types (**Table 7**).

Table 6: Bauer's (2009) four types
This table offers a short description of those types.

Bauer's types (2009)	Description
Nature sympathisers	Have a distanced emotional attitude towards nature, possibly apathetic environmentally. At the same time, they show biophilic attitudes as well: the diversity of nature is important, and nature does not have to please humans.
Nature controllers	Have conservative (political/protection) ideas concerning the appearance of nature, value the usefulness of nature, feel not especially close to nature, and would like to influence it: nature should please people.
Nature-connected users	Have a utilitarian attitude towards nature and, at the same time, consider themselves as being part of nature and feel emotionally close to it. They also show conservation traits: they wish nature to remain unchanged.
Nature lovers	Consider the diversity of nature and its pristine character as crucial. They feel themselves as being a part of nature but also foster the idea of leaving more space to nature for free development, and of reducing human influence on nature.

Table 7: Clusters compared
Bauer's (2009) four attitude types compared for difference to the two clusters found in this study.

Cluster 1	**Nature-connected users**	**Nature sympathisers**	**Nature controllers**	**Nature lovers**
Mann-Whitney U test	*p-value* 0.0026126	0.41235	0.05654	0.01796
Cluster 2	**Nature-connected users**	**Nature sympathisers**	**Nature controllers**	**Nature lovers**
Mann-Whitney U test	*p-value* 0.02905	0.1363	0.87224	0.56573

Cluster 1 showed more pronounced differences with both **nature connected users** and **nature lovers**, indicating that it is distinct from these groups. It has no significant differences with **nature sympathisers** and shows a trend towards difference with **nature controllers**. Cluster 2 also shows a difference with **nature connected users**, but no significant difference with the other three attitudes. Cluster 1 could be described as emotionally unattached, but with value placed on biodiversity and some value placed on access. Cluster 2 is more

emotionally connected, also values biodiversity and access, as well as lack of human impact and an aesthetically pristine appearance (**Table 8**).

Table 8: Clusters described
The two clusters revealed in this study could be described as 'Sympathetic Nature users' and 'Nature-Loving Users'.

Cluster 1 **"Sympathetic Nature Users"**	Cluster 2 **"Nature-Loving Users"**
Distanced emotionally and view themselves as somewhat separate to nature. **Access-oriented** and believe in influencing nature. **Balanced aesthetics**: they appreciate nature's aesthetics and value biodiversity but may not feel it needs to be untouched or completely wild.	**Emotionally connected** and view themselves as part of the natural world. **Access-oriented** and believe in influencing nature. **Pristine nature and aesthetics**: they prioritise the preservation of biodiversity and nature in its most pristine and untouched form.

The two clusters revealed by the nature-attitude section of the questionnaire were only close to significantly different, however it could reveal something to compare the proportion of those clusters within Residents and Visitors (**Fig. 13**). The Residents group was more likely to contain the cluster dubbed "Sympathetic Nature Users", while Visitors were slightly more likely to contain those people who fell into the cluster "Nature-Loving Users".

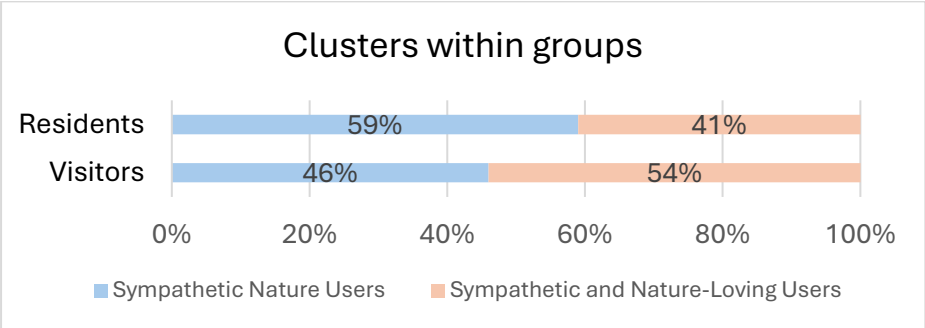

Figure 13: Nature attitudes
A stacked bar chart showing that Residents are more likely to be "Sympathetic Nature Users", and Visitors are more likely to be "Sympathetic and Nature-Loving Users".

Conflicting values

The Likert-scale section of the questionnaire included two questions specifically measuring

the values of **usability/access** and **pristineness/lack of human impact**. A comparison of the differences between the answers to these questions revealed a clear contrast between how these contrasting values were ranked by Residents and Visitors (**Table 9**). Residents showed a significant difference between the two questions, with a strong preference for human use over keeping nature pristine, while Visitors showed no significant preference between the two.

Table 9: Tests for difference in values
Tests for equal medians show a significant difference in the valuing of these two concepts for the whole cohort of respondents and for Residents, however Visitors value both equally.

Value	Mann-Whitney U Test	Whole cohort	Residents	Visitors
1b: Humans can use	Mean ranks	68.35	35.41	32.59
1c: Lack of human impact		57.14	26.09	30.90
A p- of less than 0.05 indicates a significant difference between the value of 1b and 1c.		**p-: 0.0097**	**p-: 0.0022**	p-: 0.5836
Results	**Results show a higher valuation of being able to 'use' nature across all respondents.**		**The results show a clear contrast between Residents and Visitors.**	
Interpretation	**Whole cohort**: The p-value of **0.0097** indicates that there is a statistically significant difference. The lower mean rank for the "No human impact" question suggests that respondents, on average, rated the importance of keeping nature pristine as less important than allowing humans to use it.		**Residents**: Significant difference, with a strong preference for human use over keeping nature pristine. **Visitors**: No significant preference between the two, indicating that visitors value equally the importance of humans being able to use nature and the importance of keeping nature pristine.	

4.5 Comparison of Residents' and Visitors' perceptions of Dartmoor

Those respondents whose definition placed a high emphasis on lack of human impact (**Fig.10**, sample size (N) 86, 71%) were then divided into residents (N47) and visitors (N39), and it was revealed that their perception of Dartmoor as aligning with that ecological definition was significantly different also (**Table 10**). This was an unpaired experimental design, with non-normal distribution of data and a two-tailed P-value using the nonparametric Mann-Whitney U

test. Double asterisks (**) as also seen in the box and whisker plot (**Fig.14**) of these results indicates a higher level of statistical significance. This means there is strong evidence that the difference between the groups is not due to random chance.

Table 10: Tests for difference in perceptions
This table presents the results of the Mann-Whitney U tests comparing the differences between Residents and Visitors in their perception of Dartmoor as aligning with ecological definition of wilderness. The table includes sample sizes, mean ranks, U-statistics, z-scores, and p-values, highlighting statistically significant differences between the two groups.

Comparison	Groups	Sample Size (N)	Mean Rank	Mann-Whitney U	z-Score	p-value (same median)
Perception of Dartmoor as matching the ecological definition of wilderness (see **Fig.14** also)	Residents	47	19.76	571.5	3.0255	0.00248 **
	Visitors	39	23.73			

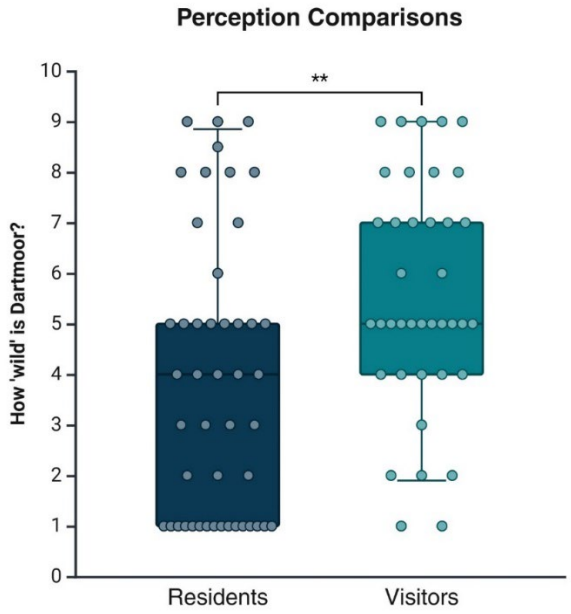

Figure 14: Perception comparisons
A box-and-whisker plot of the results from **Table 10**, illustrating some more details about the differences between Residents' and Visitors' perceptions of Dartmoor.

The box-and-whisker plot (**Fig.14**) offered more insights into the differences between Residents' and Visitors' perceptions of how "wild" (pristine/lacking in human impact) DNP is.

The line within each box is the median value, with Residents generally perceiving DNP as less wild (median around 4) compared to Visitors (median around 5). The ** symbol between the boxes signifies that the difference between Visitors and Residents is statistically significant and unlikely to be due to chance. The boxes in the plot represent the interquartile range (IQR), encompassing responses from the 25th to the 75th percentile, and the shorter IQR for Visitors suggests that their perceptions are more consistent than those of Residents, whose larger IQR reflects a greater variability in their perceptions. The whiskers illustrate the range of responses excluding outliers and span approximately 1 to 8 for Residents and 2 to 9 for Visitors, indicating that all perceptions exhibit considerable variation, with Visitors concentrated in the higher range. The dots outside the whiskers represent outliers, with several Residents perceiving DNP as significantly wilder than most others, and a few Visitors as much less wild. In summary, Visitors generally perceive DNP as wilder than Residents, and this difference is statistically meaningful.

Perception types

Using the coded definitions (**Table 4**) and comparing them to coded perceptions of Dartmoor (**Table 11**), three clusters emerge, an "Ideal Wilderness Group", whose definition of wilderness includes an emphasis on **lack of human impact**, and who perceive Dartmoor as a wilderness; an "Ecological Wilderness Group", whose definition also emphasises lack of human impact, but who do not perceive Dartmoor as a wilderness at all. Then a final group, termed the “Pragmatic Wilderness Group”, including those who either define wilderness with little to moderate emphasis on the **lack of human impact** and see Dartmoor as fitting this definition or have a high-emphasis definition but only moderately perceive Dartmoor matching it.

Table 11: Comparative content analysis
This table presents an excerpt from the comparative coding process used to convert qualitative survey responses into quantitative data for statistical analysis.

What is your definition of the term 'wilderness'?	**Coded out of 10** for the emphasis on **lack of human impact**	**How closely does the landscape of Dartmoor match your definition of wilderness?**	**Coded out of 10**	**Group**
For me it's the lack of people	4 (Moderate)	Certain areas of North Dartmoor fit the definition perfectly. It may only be a perception but if you do not see a human all day, I feel in the wilderness.	8 (High)	**Pragmatic**
A space only affected by nature itself!	7 (High)	The landscape is original a cultural and cultivated [*illegible*]. The way of putting cattle helps to conserve this landscape. So is half wilderness we call in Dutch.	5 (Moderate)	**Pragmatic**
An area free from management and intervention of human activity.	9 (High)	It does not match, as I know it is a managed and regulated national park.	1 (Low)	**Ecological**
Nature at its best - no intervention and free.	8 (High)	Very much so.	9 (High)	**Idealistic**

Among all respondents (**Fig.15**), the "Idealistic Wilderness Perception Group" made up 20%, the "Ecological Wilderness Perception Group" made up 23.5%, and the "Pragmatic Wilderness Perception Group" was the largest by far at 56.5% and includes the 29% of respondents whose definitions of wilderness centred human access and experience. The "Idealistic Group" could be interpreted as having the lowest ecological literacy levels, and the "Ecological Group" could

be interpreted as having the highest ecological literacy levels.

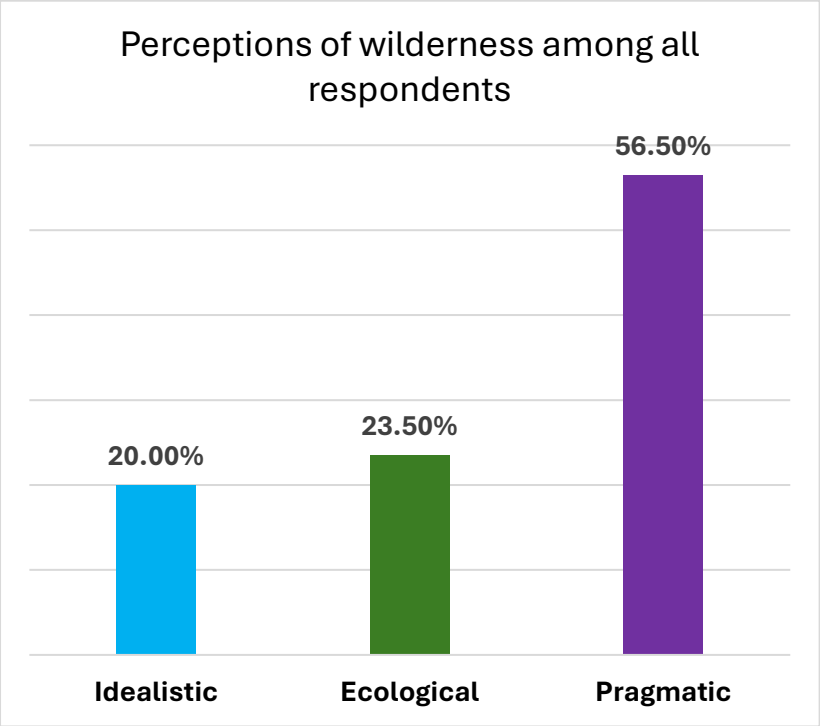

Figure 15: Wilderness perception groups
The bar chart shows the proportions of the three types of wilderness perception groups identified across all respondents

When the wilderness perception groups were compared by Visitor and Resident groups, there were clear differences (**Fig.16**), as indicated by the statistical difference tests (**Table 10** and **Fig.14**), with Visitors much less likely to be in the Ecological group and much more likely to be in the Idealistic group. Although Residents were most likely to be in the Ecological group, and least likely to be in the Idealistic group, a proportion were also in this group who perceived the landscape of Dartmoor to be lacking in human impact.

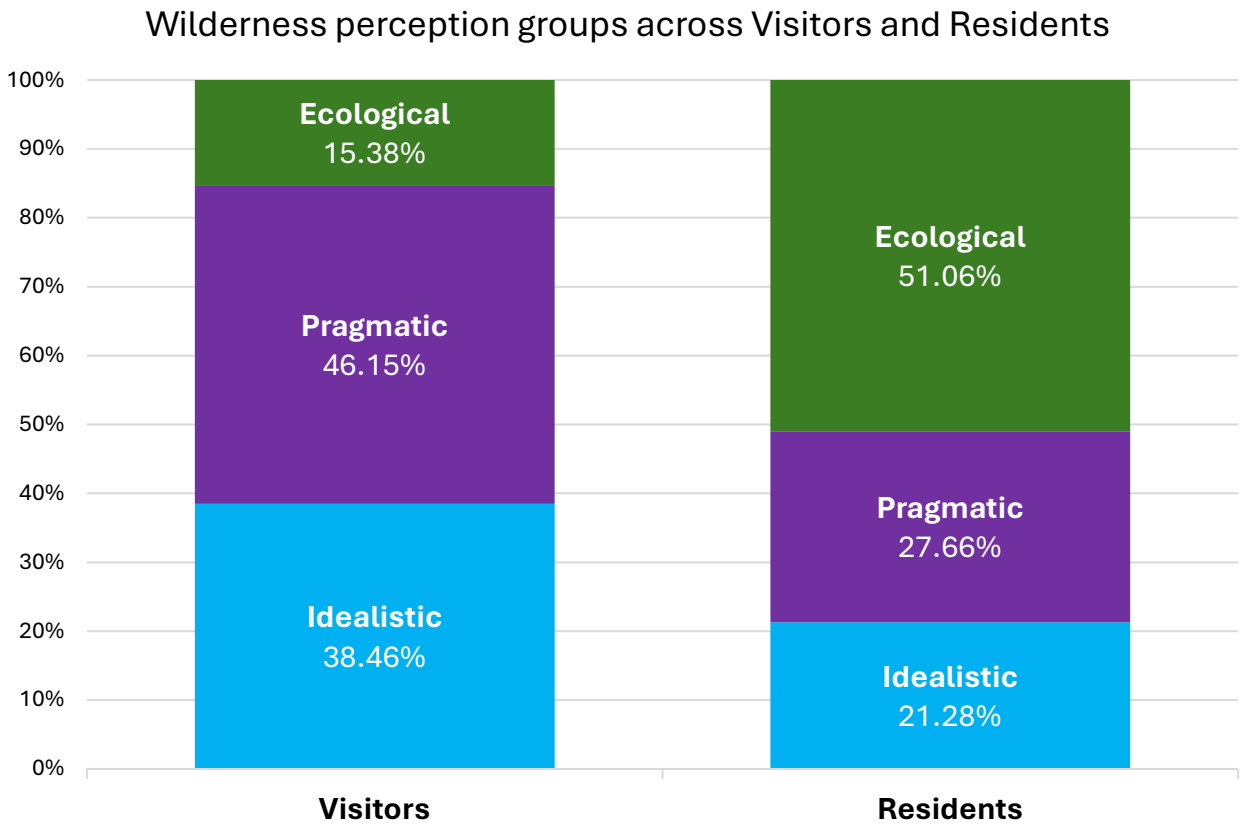

Figure 16: Wilderness perception groups: Residents versus Visitors
A stacked bar chart illustrating the difference found between Visitors' and Residents' perceptions regarding wilderness and the landscape of DNP

4.6 All results

Across all results (**Table 12**) differences and similarities have been identified between the values, definitions, attitudes and perceptions of Residents and Visitors regarding the term wilderness and the landscape of Dartmoor National Park. There were statistically significant differences revealed between Visitors' and Residents' definitions, specific values, and perceptions related to the human impact or lack thereof in DNP.

Table 12: Results summary
All results, both qualitative and quantitative, gathered to sum up the differences found between Residents and Visitors.

	Data type	Visitors	Residents
Top three most important traits of DNP	qualitative	1. landscape features	1. landscape features
		2. solitude	**2. habitats**
		3. vastness	3. vastness
Top three themes in wilderness definitions	qualitative	1. lack of human impact	1. lack of human impact
		2. naturalness	2. naturalness
		3. no visible human impact	**3. unknown/ unexplored**
Attitudes	quantitative	More likely to be a **"Sympathetic Nature-Loving User"**	More likely to be a **"Sympathetic Nature User"**
Values	quantitative	**Equally value access to nature and the lack of human impact**	**Significant preference for access over the lack of human impact.**
Perception groups	mixed methods	**Most Pragmatic (46%)** **Least Ecological (15%)**	**Most Ecological (51%)** **Least Idealistic (22%)**

5. Discussion

5.1 Methods

The study achieved a strong response rate and the sample size of 124 questionnaires was significantly larger than the aimed for minimum of 75, however post-hoc analysis revealed a small effect size and small power, which along with the potential sample biases are limitations, however, consistency across qualitative and quantitative data supports the validity of the findings. Overall, the sampling strategies suited exploratory research where the primary aim was to gain some initial insights rather than make broad generalisations. For more rigorous, representative studies, it would be beneficial to incorporate more structured sampling methods to ensure a more diverse and representative sample (Andrade, 2021; Stantcheva, 2023).

5.2 Perceptions of Dartmoor

This study showed that a proportion of both Visitors and Residents are significantly likely to perceive Dartmoor as **lacking in human impact**, showing that not only is DNP often referred to as 'wilderness', as indicated by DNPA (2017b) and Smith et al. (2018), it is often perceived as a *pristine* wilderness. The significant differences in values, meanings and perceptions shown between visitors and residents in this study builds upon the work of van der Zanden et al. (2018*)*, who identified that different groups could focus on similar landscape features but attach different meanings and significance to those features. There were also some clear consistencies in values and meanings between the different groups and across time, as also seen in Ólafsdóttir et al. (2020).

Most respondents had a definition of wilderness that strongly emphasised **lack of human impact**, aligning with ecological classifications (Landres et al., 2008), and this finding could challenge existing evidence that eco-literacy is low in the public (Koyama and Watanabe, 2023). It could also be indicative of the tendency for representations of wilderness areas to be 'human-free' (Smith et al., 2018), and Visitors' definitions were much more likely to include the aesthetic value of lack of visible human impact, reflecting the idea that 'pristine' is implicitly a visual concept (Bartlett, 2023), rather than an understanding of a technical ecological concept. Special landscape features, including vastness were valued consistently across stakeholder groups in this study, and as the 'wildest' landscapes within British boundaries (Carver et al., 2002; Fig 4), National Parks offer important cultural experiences of wilderness attributes. For some people, a landscape that *looks* 'wild', or where individuals can *feel* alone, as identified in Ólafsdóttir et al. (2020), could become synonymous with what the environmental sector terms wilderness, overlaying confusing and potentially problematic assumptions onto a landscape and within communication related to the management of that landscape, as highlighted by Saarinen (2018).

This study revealing a potential "Ideal Wilderness Perception Group", that both understands wilderness to mean lacking in human impact, and that also perceive the landscape of Dartmoor to be wilderness. This finding is somewhat contrary to Zanden et al. (2018), who identified negative responses to the 'abandonment' of land by humans across both locals and visitors, however the different framing of this similar lack-of-humans theme could be

771 influential (Hart & Larson, 2014). Zanden et al. (2018) also reported that people who were
772 more positive about abandonment were also more likely to view human influence as
773 'unnecessary', a description that aligns with the "Idealistic Group" in this study. The "Idealistic
774 Group's" understanding of wilderness could therefore reflect a specific and perhaps idealised
775 perception of natural human-free landscapes, and as Dartmoor does not fit this strict
776 definition of wilderness, this indicates a disconnection between an ideal and a landscape
777 reality. This builds on existing evidence of potential conflict zones within landscapes between
778 the public and experts (Zoderer 2020). Visitors were least likely to be in the "Ecological
779 Wilderness Perception Group", indicating that a specific campaign of information regarding the
780 ecological status of National Parks and ecological 'wilderness' in the UK more broadly may be
781 beneficial. This deeper investigation into how the definitions and perceptions collected in this
782 study relate to each other reveals that it is consistent with previous evidence that ecological
783 literacy levels need to be raised in the public (Koyama and Watanabe, 2023).

784 **Attitudes to nature**

785 This study added to the literature on the complexities of the human-nature relationship
786 (Stenseke, 2020), finding some distinct differences in attitudes and viewpoints even within a
787 population of people living in or visiting a National Park. The two identified attitudes went
788 someway to reflect some of the differences between Visitors and Residents already identified
789 in this study. Bauer's "nature sympathizers" [sic], most closely akin to the "Sympathetic Users"
790 in this study, appeared to be an attitude that had not been described before, perhaps specific
791 to societal context. There are similarities between the UK and Switzerland when it comes to
792 nature: small country size, highly populated and with no designated wilderness areas (Fig.3),
793 all of which could be factors that influence a society's range of nature attitude types (Bauer
794 2009), and possibly why this 'new' attitude has also shown up in the UK. Differences in
795 attitudes can stem from contradictory viewpoints between social groups (Zoderer and Tasser,
796 2021), which this study has shown do exist. Both clusters in this study were significantly
797 different from the Bauer type "nature-connected users", who 'felt threatened by the concept of
798 wilderness'. This attitude may have been more represented within the agricultural community
799 of DNP, from whom this study did not gather responses.

Conflicting values and perceptions

This study found a direct contradiction when investigating the values of human access and lack of human impact. The human-nature relationship is complex and often contradictory (Cronon, 1996; Stenseke, 2020) and the understanding of how people value nature is diverse and many-layered (Gross, 2023). For the Visitors group in this study a values conflict was revealed: as one respondent exemplified with their comment to the researcher, "*I want to come up here, but I don't want anyone else to be up here!*" Bauer (2005) and Vining et al. (2008) also indicated this "cognitive dissonance", and Clayton et al. (2016) commented that a belief that "true" nature is separate from daily human life and policies that protect nature by isolating it from humans could exacerbate nature disconnection and the 'extinction of experience' (Soga & Gaston, 2016) and foster a preference for an idealised nature. The paradigm in ecology has considered humans as an external disturbance on the "natural" ecosystem (O'neill & Kahn, 2000), which could have contributed to the internal human conflict seen in this study. Visitors in this study were more likely to have the conflict of valuing both human access and pristineness equally, to be in the "Nature-Loving User" attitude type, and most likely to be in the "Pragmatic Wilderness Perception Group", indicating a desire to be included in a functional ecosystem without harmful impact. All the respondents whose definitions of wilderness included humans were in the Pragmatic group. There have been calls to include humans as "hyperkeystone species" (Worm & Paine, 2016) into the idea of functional ecosystems, to better understand the far-reaching impacts of the role of humans within nature, not as separate from it. The "Pragmatic Wilderness Perception" group, which made up more than half of all respondents, could exemplify the ideal of the social-ecological system, offering a step towards a reframe of the human-nature relationship (Stenseke, 2020). This balanced view could represent humans as seeing themselves as an integral part of the natural world (Schoon & Van Der Leeuw, 2015) and encouraging it could go some way to restoring human knowledge, connection and function within nature (Robinson et al., 2021), and be seen as an opportunity for reconciling cultural and wilderness values for future landscape restoration (Deary, 2016).

6. Implications and Opportunities

6.1 Conflicts Over Land Use:

If the concepts of 'wilderness' and 'lack of human impact' are synonymous to the minds of a large section of visitors to DNP, as indicated in this study, there is a risk that this is the case in all National Parks in the UK, and that these could be areas where conflict is more likely (Zoderer et al., 2020). Similarly, the proportion of the users of DNP that see the landscape as lacking in human impact may be ignorant of the intricate and intimate relationship that exists between traditional farming culture and the landscape of DNP (Mikołajczak et al., 2022), a perception which could lead to a lack of support, advocacy and resources for the agricultural population who are mostly responsible for the 'iconic brand' and internationally important habitats of Dartmoor (Clark & Thompson, 2018). Protection and welfare for agricultural communities were originally supported as a function of the National Parks and Access to the Countryside Act (1949), but this was ultimately not included (Barker & Stockdale, 2008), a historical legacy that could be contributing to an ignorance of the presence and value of traditional agriculture in National Parks found in this study. There are also many sources that support restoration projects such as appropriate woodland expansion on upland moorlands (DLNP, n.d.; Good et al., 1997; Murphy et al., 2022), and yet a recent review of uplands coverage identified a lack of research on the impact that increased tree cover could have on CES (FitzGerald et al., 2021), and therefore visitor perception, which this study indicates could involve contrasting interests, attitudes and values.

6.2 Participatory approaches

Participatory approaches are already a gold standard for land management projects and interventions (Ainsworth et al., 2020; Biggs et al., 2021), especially when managing National Parks and between stakeholders with differing priorities (Bauer, 2005; Gross et al., 2023) and in the face of conflicted perceptions (Masterson et al., 2017). This study has shown evidence of specific differing values, and bolsters the notion put forward by Zoderer and Tasser (2021) that the need to consider the plurality of people's wilderness representations must be included in participatory processes. Titus et al. (2024) state that public perceptions are likely to influence the success of landscape interventions, and recommend targeted engagement efforts, which this study could help to identify in terms of knowledge gaps and potential areas of conflict.

6.3 Co-constructing contextual terminology

The results of this study support the work of Stenseke et al. (2020) advocating for co-constructing shared meanings of terms at the beginning of project negotiations. Social-ecological systems are defined as ecosystems co-constructed with humans (Schoon & Van Der Leeuw, 2015), and as shown here, humans have a range of perceptions that could be contradictory and hinder decision making (Stenseke, 2020), therefore National Parks are optimal sites for creating management frameworks that could curate a sense-of-place around a functional ecosystem (Kibler et al. (2018), or even a sense-of-self and purpose within a functional ecosystem (van Valkengoed et al., 2022).

To foster understanding of local landscapes and enhance pro-environmental behaviour (Pitman et al, 2020) discrete 'place-specific languages' (Hull & Robertson, 2000; Saarinen, 2018) could be developed, and information campaigns could include a glossary of terms for specific sites that are regularly assessed by all stakeholders (Titus et al., 2024), helping to foster the similarities and common ground found between stakeholders in this study.

6.4 Communication and Education:

This study has indicated a potentially significant knowledge gap between an 'Ideal Wilderness Perception' and the social-ecological reality of National Parks in the UK in the perceptions of key stakeholders. There have been calls for scientists to integrate local people and develop an enriched language to use in their communication and decision making for decades (Cooper, 2000; Requier et al., 2020), and this study shows that there could also be a need to rectify knowledge gaps through on-site interpretation, as support from visitors for land management interventions has been acknowledged as more likely if a landscape can 'communicate' any human action as ongoing respectful stewardship (López-Rodríguez & Hernández-Jiménez, 2022). A large proportion of all respondents to this study were in the "Pragmatic Wilderness Perception Group", indicating an opportunity to harness more balanced views of landscape systems for the dissemination of context-specific information. In DNPA's (2024) survey, data was collected regarding information sources used prior to visiting DNP, which would have been an interesting variable for this study, and a potential rich source of understanding visitors for future research (Hausmann et al., 2020).

7. Conclusions

Essentially, this study is about the complexities of the human-nature relationship, exhibited in this study by the range and variety of connections people had to a National Park in the UK. The contrasts of perceptions, meanings and values throughout this research could be indicative of a deeper disconnect between humans and nature in general.

Humans are inherently dependent on the health of our planetary systems and yet perceive "real" nature as something else. Access to and use of "real" nature was valued just as highly by some stakeholders in this study as the idea of "real" nature being left alone by humans. However, arguably, there is no landscape globally that has not been impacted in some way by humans, by what we have put into the atmosphere for example, by anthropogenic biodiversity and habitat loss, and by climate change.

The concept of the 'pristine wilderness' as an ideal version of a landscape could foster disconnect, disappointment and conflict among the people who are in relationship with that landscape. Human beings are at a crossroads of perception: we could be starting to integrate ourselves back into the idea of functional ecosystems and starting to perceive "real" nature as including our impacts, both harmful and restorative.

Efforts need to be made to communicate the complex realities of landscapes that both 'seem' lacking in human impact and are in fact inherently shaped by it. In National Parks, the cultural values of 'wilderness attributes' such as solitude can still be promoted, while also championing and celebrating the functional roles that humans play in these social-ecological systems. Nature-connection is imperative for human pro-environmental behaviour, and the contradictions of the concept of 'wilderness' are only adding to a disconnect.

8. References

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9. Appendices

9.1 Appendix A: Questionnaire sample

Information sheet read and verbal consent given ☐

1. How important do you consider these statements when thinking about nature?

	Not important 1	2	3	Important 4
That there are many different species of animals and plants				
That it can be used by people				
That it is 'pristine' (free of human impact)				
That I can do sports and hobbies there				
That it is remote (far from human habitation)				
That there are no rules or conventions				
That it is familiar to me				
That it does not change or does not change much				

2. How true are these statements to you?

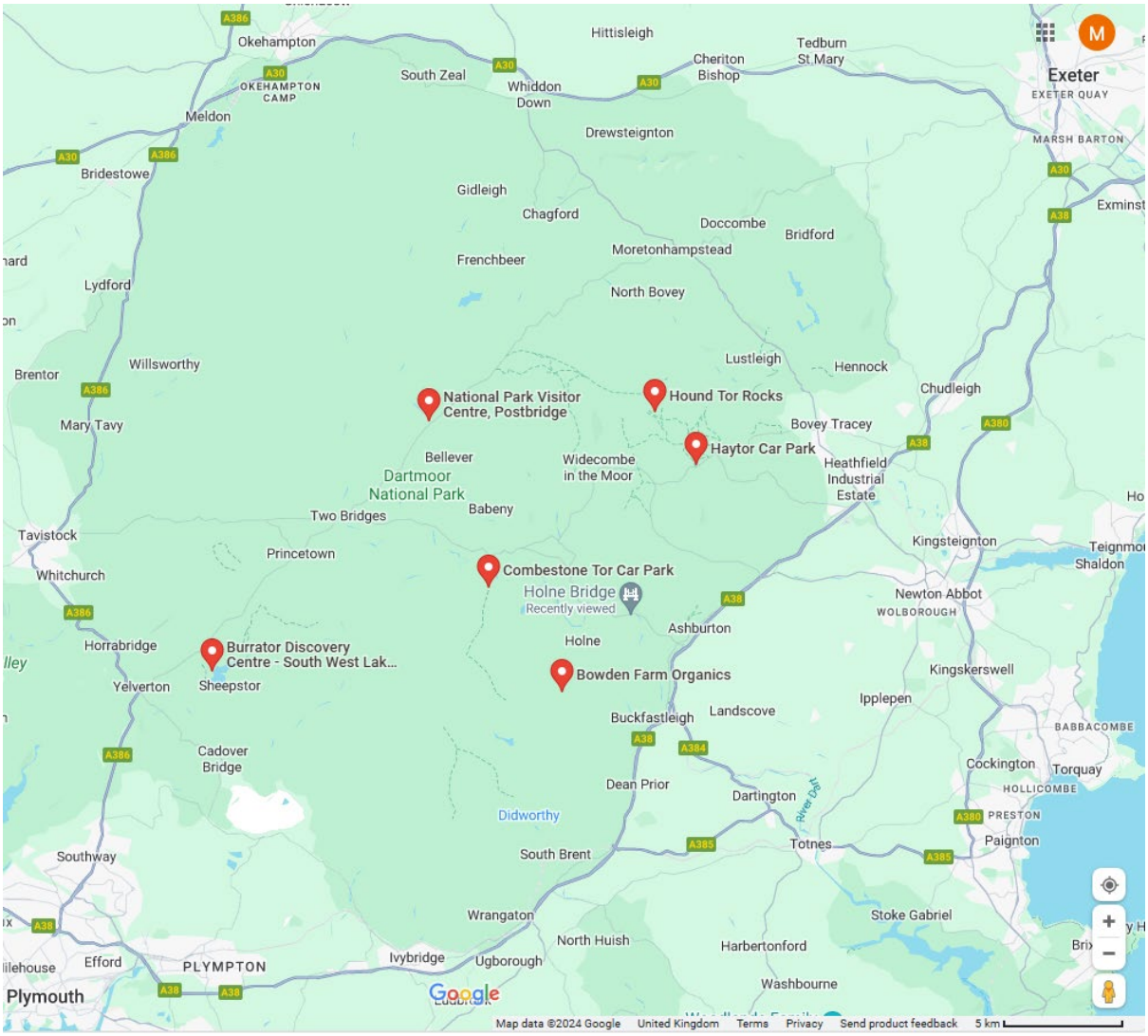
	Not True 1	2	3	4	True 5
When settlements and agricultural lands become flooded, it is a sign that humans have expanded their territory too much					
It is important that nature is aesthetically pleasing to people, regardless of the degree of human influence					
In gardens, nature should be neat and orderly					
Emerging technology is the only solution to protect ourselves against the growing numbers of natural disasters					
I feel I am a part of nature, just like plants and animals					
We should leave nature as much space as it needs to develop freely					

3. If you think about areas of land being unmanaged or 'abandoned' by people, how strong are any of these feelings?

	Very weak 1	2	3	4	Very strong 5
Feelings of concern					
Feelings of fascination					
Feelings of wellbeing					
Feelings of being threatened					

Survey adopted from Bauer, Wallner and Hunziker (2009)

9.2 Appendix B: Map of survey sites



Source: Google maps 2024

9.3 Appendix C: Information sheet

Eden Project UNIVERSITY CENTRE CORNWALL COLLEGE

UNIVERSITY OF PLYMOUTH

Information Sheet for Survey Participants

Student research for Ecological Restoration MSc dissertation

- **Title of project:** *Visitor perceptions of the landscape of Dartmoor National Park (DNP)*
- **Aims**: to gain insight into how visitors perceive the landscape.
- **Potential benefits** of the research are to enhance clarity of communication between various stakeholders of DNP.
- **Methods**: A multiple-choice questionnaire and three more in-depth questions requiring written responses. The researcher will be on hand to answer any questions.
- **Confidentiality**: Surveys are anonymous at source and contain no sensitive information such as asking about illegal activities. Over 18s only.
- **Time commitment**: The survey will take at least **10 minutes.**
- **Right to withdraw**: The participant can withdraw from the survey at any time with no adverse consequences.
- **Right to remove**: The participant can have any supplied data destroyed on request up to June 29th, 2024, by requesting a unique id number to quote in correspondence with the researcher.
- **Principal researcher**: Maeve Leith / maeve.leith952@live.cornwall.ac.uk
- **Supervisor**: Chris Smillie / chris.smillie@cornwall.ac.uk
- **Results** of the research can be made available to participants by request, due August 2024.

9.4 Appendix D: Detailed demographics

Age bracket	(DNPA, 2012)	(DNPA, 2024)	My results
Under 16	Unspecified	16%	Unrecorded
16-24	Unspecified	11%	14%
25-50	38%	58%	25%
51-64			32%
65+	Unspecified	14%	29%

Age bracket	Dartmoor 2021 (ONS)	This study

Total F under 16	14.3%	Unrecorded
Total F 16-24	6.4%	0%
Total F 25-50	24.8%	26%
Total F 51-64	24.4%	38%
Total F 65+	30.0%	35%
Total M under 16	14.8%	Unrecorded
Total M 16-24	8.0%	7%
Total M 25-50	25.8%	22%
Total M 51-64	23.0%	15%
Total M 65+	28.2%	56%

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1319 9.5 Appendix E: All themes with words and phrases

Themes – words and phrases examples	Comment amount	Percent
Landscape features - *tors, rivers, geology, valleys, hills, least, open countryside, "personality of the area", barrenness, uniqueness, ruggedness, green, landscape*	98	17%
Habitats - *Woodlands, moors, heath, bogs, marshes, temperate rainforest, fields, nature, "varied", also references to 'flora and fauna', "diversity", "different areas", wildlife haven, nature-rich areas, hay meadows, scrub,*	66	11%
Vastness - *Wide open, walk for hours, space, size of area, out in the countryside, remoteness, expansive, big, barren vistas, places inaccessible, desolation, huge, wide, large, immerse, scale, high***.**	50	9%
Solitude - *Peace, tranquility, quiet, empty, freedom, walk for hours without seeing others, not too busy, isolation, hard when there are lots of people, remoteness, escape, emptiness, a feeling of remoteness, away from the rat race, lack of humans, space and aloneness, serenity, calming sounds, hidden places, not crowded with people, I can make up my own walks, places inaccessible via transport, desolation, natural sounds.*	49	9%
Aesthetics - *beauty, views, 360 degree, differences, scenery, appearance, awesome, uniqueness, stunning, green, visually, nature to*	45	8%

look at, a feast for the eyes, spacious vistas, impressions, superficially natural, contrast in appearance to urban, atmosphere.		
Biodiversity - *Specific species mentioned, such as birds or lichen. Also references to 'flora and fauna'. Skylarks, orchids, heather, wildflowers, trees, plants, vegetation, wildlife, gorse, wild animals (also in Seeing roaming animals – Theme 13), insects, mosses, too many sheep, species, rare species,*	43	7%
Recreation - *Walking, wild camping, rock-climbing, challenge of the hills, explore, ten tors, riding, cycling, escape, holiday, interesting things, golf, swimming, running, enjoy,*	41	7%
Access - *Paths, opportunities to explore, rambling, public access, footpaths, bridal paths, freedom to walk and ride, Right to Roam, ability to wild camp, walkways, wander at will, open access, free access, open, ability to immerse,*	39	7%
History and stories - *Archaeology, pre-history, bronze age, mining, agricultural, sense of self because the land has been here for all time, contact with history, industrial, medieval, 'Beast of Dartmoor', neolithic tombs, stone circles, abandoned farmhouses, human settlements, myths, stories, early husbandry.*	28	5%
Variations on the word "wild" mentioned	28	5%
Roaming animals - *Ponies, 'wild roaming animals', 'wild animals', 'animals', sounds of animals, animals grazing freely, cows, sheep,*	20	3%
Human communities - *'Looked after', farming, commons, villages, pub, café, shop, man co-exists with nature, managed, tourists, all keen to work together to create a better Dartmoor.*	18	3%
Farming/ grazing - *Traditions, stock grazing, managed landscape, farming working with nature, commons, sheep, agriculture, a product of human activity, nature-friendly farming, community.*	15	3%
Lack of modern human habitation - *Lack of technology and civilization, low population, not overdeveloped, low visual evidence of human activity and waste, kept clear of our footprint, contrast to urban, lack of humans, not too much human interference, anti-modern, impression of uninhabited land, no major tourism, away from the masses.*	13	2%

Pristineness - *Un-spoilt, natural, left to nature, left unchanged, keeps to its natural state, untouched, "real" / true, the landscape belongs to itself, left mainly unchanged, nature in own state, very natural.*	11	2%
Clean air/water - *Fresh air, lack of pollution, clean rivers*	8	1%
Spiritual - *Part of my soul, sense of self, in essence; life sustaining.*	2	0%
Total comments around themes	574	100%

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1321 9.6 Appendix F: Formal definitions' themes

	Lack of human influence	Large size	Recreation opportunity	Natural character	Habitat or species protection	Remoteness from human habitation
Australia	x	x	x		x	x
Canada	x	x	x	x	x	
Iceland	x	x	x			x
Japan	x			x		
Mexico	x	x	x	x	x	
New Zealand	x	x	x			
Russia	x				x	
South Africa	x		x	x	x	
United States	x	x	x	x		
IUCN* (Dudley, 2008)	x	x		x		
Wild Europe (Aykroyd et al, 2020)	x	x		x	x	

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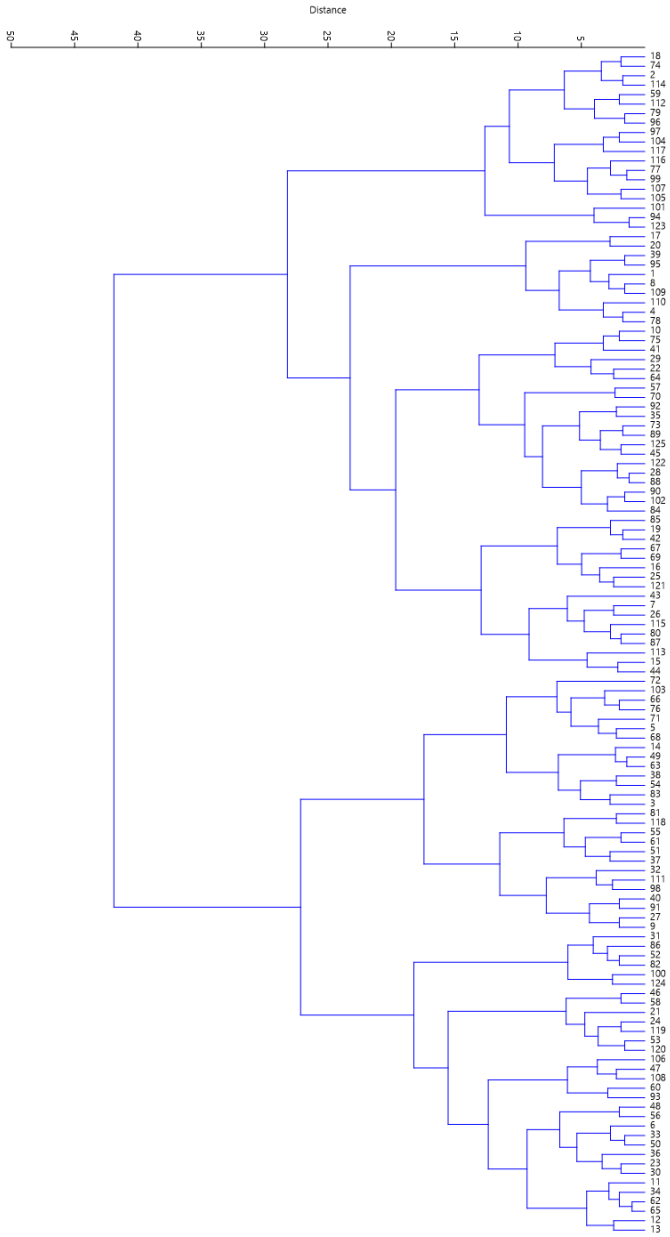
1323 9.7 Appendix G: Deductive thematic analysis

Theme in public definitions		Theme in legal definitions		Public themes condensed into legal themes	
Lack of human impact	26%	**Lack of human influence**	27%	Lack of human influence / impact	33%
Pristine	7%				
Naturalness/freedom for nature	16%	**Natural character**	17%	Naturalness/freedom for nature / No visible human impact / Natural character	28%
No visible human impact	12%				
Remoteness/hard for humans to access	9%	**Remoteness from human habitation**	5%	Remoteness from human habitation / hard for humans to access	16%
Unknown/unexplored	7%				
Vastness	5%	**Large size**	20%	Vastness / large size	5%
Solitude/freedom for humans	8%				
Access for humans	5%	**Recreation opportunity**	17%	Recreation opportunity / access for humans / solitude / freedom for humans	15%
Aesthetics	2%				
Biodiversity	4%	**Habitat or species protection**	15%	Habitat / species / biodiversity protection	4%

9.8 Appendix H: Dendrogram of clusters


Distance
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