UK Centre for Ecology & Hydrology

UK-SCAPE at the British Ecological Society meeting 12-15 Dec 2021, Liverpool

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UK-SCAPE
UK Status, Change and Projections of the Environment

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Executive summary

The team of five, who staffed the stand and conducted the rapid roving survey, spoke to over 370 people attending the event in person (~50% of in-person attendees).

On the stand all three aspects of UK-SCAPE data discovery, delivery and use were highlighted. Staff engaged people by:
(i) explaining the UK-SCAPE programme and inviting them to complete a rapid survey focused on data access and acknowledgement.
(ii) demonstrating the Data Science Framework, and via a survey and in-depth feedback discussion, staff obtained views on the future requirements and priorities for development.
(iii) demonstrated a Shiny App displaying customisable visualisations of biodiversity trends and explained the aims of a NERC Knowledge Exchange fellowship, and
(iv) through discussion and the provision of themed postcards, highlighted the importance of citing data correctly to acknowledge NERC as a funder of UKCEH national capability and the role of the Environmental Informatics Data Centre (EIDC).
Staff also distributed branded material as a means of reminding participants how to access UK-SCAPE data.

Roving rapid survey focused on data discovery and acknowledgement.
In total 191 people completed the rapid survey (77% online, the remainder as a paper copy) designed to raise awareness of the 23 datasets and data products UK-SCAPE have delivered to date and understand participants views on acknowledging third party data.
Around half (44%) of respondents had used at least one of the data products produced by UK-SCAPE with Landcover maps (53%), Biological Records Centre (47%) and UK Butterfly Monitoring Scheme (35%) the most used services.
Several of the data products were utilised by less than five respondents perhaps indicating a mismatch with BES attendees and that further work is required to bring UK-SCAPE data to the attention of other academic audiences (e.g. attendance at the British Hydrological Society is planned for 2022).
Approximately a third of respondents suggested enhancements to the current provision of UK-SCAPE data products, broadly defined as: (i) improved discoverability, (ii) value added access, and (iii) enhanced utility of the data sets and data products.
Over half of respondents (56%) reported they never used any of the UK-SCAPE environmental data sets. They were given branded material to build recognition and as an *aid memoir* of how to access UK-SCAPE datasets. Almost equal numbers of the respondents who did not use UK-SCAPE projects' data products reported they were not aware of their existence (50) or they were not relevant to their area of science (46).

Overall, 64% of respondents reported they always accredited third party data used in generating their own research. Time and space limitations in journals and at

events such as the BES were cited as reasons for not acknowledging third party data sources

Acknowledgement via a persistent objective identifier such as a Digital Object Identifier or DOI (67% of respondents), and acknowledgment in the text of the article or presentation (61% of respondents), were the two most common means of accrediting sources of third-party data. In discussion, respondents acknowledged the latter was difficult to track. The majority stated that a persistent objective identifier was the way forward either on the dataset or when the dataset was lodged in a journal.

Action points arising from the survey include:

- Promote the availability of data and data products via the UK-SCAPE Digital Assets Catalogue at conferences across other sectors.
- Consider advertising access to datasets more widely e.g., science magazines, attendance at more science events.
- Ensure all datasets lodged in appropriate repository that issues a persistent object identified (e.g., EIDC) and discourage staff providing data by other means e.g., downloads from project websites.
- Incorporate feedback from the DSF survey into the development of the Data Labs.

Co-designing Data Science Framework

Over 50 people were attracted to the stand and discussed data access. In total 39 delegates completed the questionnaire and 64.3% stated that access to data was the biggest challenge. Over 80% reported standardisation and integration of different data sets would save time during analysis. Overall, the discussions at the event and feedback received from the questionnaire provide the confidence, support and evidence that what UK-SCAPE researchers are doing is valued by the community and is something that they will certainly benefit from.

Demonstrating use of UK-SCAPE data

Around thirty-five delegates, were shown a Shiny App displaying customisable visualisations of biodiversity trends based on model outputs produced by researchers at BRC. The majority were postgraduate students, but also some senior academics and conservation practitioners. The engagement resulted in four organisations joining the Knowledge Exchange partnership. Interactions with BES attendees confirmed there is broad interest in the methodologies UKCEH has developed to analyse biological records data to produce indicators of biodiversity change. Participation in the UK-SCAPE stand provided a friendly interface to introduce new analytical tools and demonstrate their potential to a non-technical and interdisciplinary audience, highlighting the importance of knowledge exchange to amplify the reach and impact of our science.

Conclusion

Attendance at the event fulfilled the intended aims. Over the course of three days, the UK-SCAPE Team enhanced recognition of i) UKCEH and our role in delivering NERC funded national capability; ii) the quantity and quality of freely available UK-SCAPE data; iii) the range of monitoring and survey taking place across terrestrial environments (land, water, air, soils); and iv) reinforce the principle of co-designing delivery and use of the data.

1 Introduction

The UK Status, Change and Projections of the Environment (UK-SCAPE) programme undertakes research and provides national-scale data and models. Collectively, these can be used to achieve a new integrated understanding to tackle environment challenges. It aims to improve our understanding of the consequences of interventions in the UK landscape and allow researchers to answer high-level questions relating to the environment.

The Natural Environment Research Council funds the programme through its National Capability award. In doing so, UK-SCAPE science is recognised as being:

- national and decadal in scale.
- makes a substantial contribution in volume and quality to UK environmental science.
- demonstrates benefit to the wider UK community of environmental scientists and users.
- is nationally outstanding in purpose and scientific scope.

Engaging the research community in the design, development and production of UK-SCAPE features within the delivery plan. At the recommendation of the UK-SCAPE Programme Advisory Group, we have participated in an established community event that has a broad reach across the ecological community.

The UK-SCAPE Programme Board approved the proposal and associated funds to exhibit at the British Ecological Society annual meeting in 2020. Participation was postponed until 2021 because of the Coronavirus pandemic. The option of attending in-person in 2021 was favoured over a virtual presence in 2020.

Knowledge from the NERC Impact Development Programme was used to inform planning. The concept of the “logic model framework” was adhered to when developing the three components of the engagement: discovery, delivery and use of national capability data and data products (Fig 1). The logic model framework comprises five sections with associated questions to enable targeted and focused thinking: Why, Who, How, With what impact, With what evidence. This report is also structured to follow the logic framework. It explains the purpose of the engagement followed by the results for each of the three major components:

(i) Data discovery - raising awareness of UK-SCAPE data products (section 2).

(ii) Data delivery - co-design improvements to the UK-SCAPE data science framework (section 3).

(iii) Data use - demonstrating data use and widen the existing NERC Knowledge Exchange partnership (section 4).

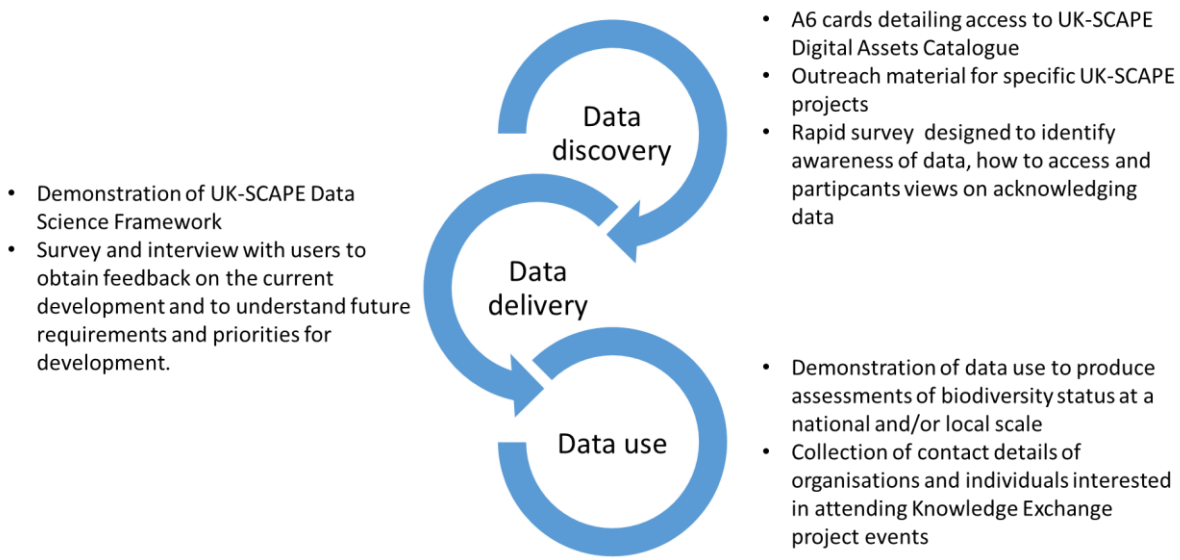

Figure 1 Schematic of the three elements highlighted on the UK-SCAPE programme stand at the British Ecological Society meeting December 2021.

2 Raising awareness of UK-SCAPE data products

2.1 Strategy for engagement

In the lead up to the BES event, the logic model framework provided structure to plan and revise the scope of work. Flexibility in our approach was needed owing to the potential impact of covid and ongoing changes in resource availability. A summary of the approach is outlined in Table 1, the full plan is provided at Appendix C.

Table 1: Outline of original event plan

Logic Framework	As interpreted by UK-SCAPE	Planned Action
Why engage?	What difference are we trying to make?	• Raise awareness of publicly funded UK-SCAPE programme. • Highlight the availability of open access data • learn how delivery and environmental monitoring can be improved.
Who are we targeting?	Who are we trying to engage with UK-SCAPE research?	• A wide range of 'potential data users', including those that need monitoring data and model data products.
How to engage?	What methods will we use to engage people with UK-SCAPE research and when?	• Direct interaction through participation in an exhibition • Mixture of marketing materials and approaches. Relatively diverse gathering of the target audience for UK-SCAPE data products (academics, practical conservation and range of governmental (GO) and non-governmental organisations (NGO).
	How will we maximise	• Pre event advertising e.g., Blog, website, Twitter • Visual impact and large footprint of stand at venue

	involvement with the event?	• Feature as sponsor in BES materials (delegate information pack, TV screens, Whova app) • Poster Session • Varied options for engagement (questionnaires, demonstrations, information exchange, visual displays),
	What will be on the stand?	• Monitors for demonstrations • Monitor for Video • Posters • Table and display units with hand out material.
With what impact?	What do we hope will change as a result?	• Increased number of people aware of UK-SCAPE data and data products • Increased downloads and enquiries following exhibition • UK-SCAPE Scientist will learn to provide 'better' data products by understanding users • UK-SCAPE Scientist will co-design better data delivery mechanisms by understanding users
With what evidence?	How can I evidence that change?	• Count of resources used/taken (badges, pens, postcards). • Count of surveys completed. • Activity on UK-SCAPE websites (including Digital Asset Catalogue) • Activity on social media (Twitter) and the conference phone app (Whova).

2.2 Results of engagement

Interaction at the stand

Visual Presence: The stand was open on three sides, not two as originally planned, so the team improvised and used the UK-SCAPE banners that were intended to provide a backing screen were 'wrapped' around the corner poles (Figs. 2-4). The outcome, although not as planned, provided a strong corporate UKCEH presence.

In addition, monitors throughout the exhibition hall and the delegate pack featured UKCEH as a sponsor (Figs.5-6)

Figure 2. Front of UK-SCAPE stand set up with A6 cards

Figure 3. Left view of UK-SCAPE stand with the four aspects highlighted (1) front of stand with 'give-away' material highlighting UK-SCAPE Digital Assets Catalogue and UKCEH banners, (2) workstation demonstrating data science framework (3) workstation and poster demonstrating Knowledge Partnership and a customisable visualisations of biodiversity trends (4) video screen showing UK-SCAPE data videos.

Figure 4. Right view with UK-SCAPE team interacting with participants.

Figure 5. One of the monitors around the ACC conference centres featuring UKCEH as a sponsor

Figure 6. Delage Pack showing front cover and list of Sponsors and Exibitors, with UKCEH highlighted.

Number and duration of interactions: A simple method was planned to establish the number of interactions between delegates and the UK-SCAPE. The team were to give everyone they spoke with a button badge (Fig. 7). The total number of interactions (both at the stand and from the roving survey) was to be deduced from the count of badges. This system, which has worked well on single day events (e.g., Dick *et al* 2021) was less effective at this multi-day event. The discipline of handing out stickers varied between individuals and between sessions which could become busy during breaks. At times, the team diligently recorded every interaction although there were tendencies for this to be overlooked and the discipline waned over the 4 days. At the end of each day, each team member recorded the total number of interactions based on personal notes/button badges or estimates.

Figure 7. Button stickers (UK-SCAPE logo) given to people engaging in one the activities or a conversation with UK-SCAPE Team members

The team of five who staffed the stand and conducted the rapid roving survey spoke to over 370 people attending the event in person. It was heartening that in the order of 20-30 people spoke to more than one staff member because they were keen to learn more either about the availability of free environmental data or they requested a demonstration from the experts on the stand (topics covered: new tools and script to aid discovery, analysis and data use). The organisers estimated that around 700 people attended in person, which means the UK-SCAPE team, interacted with ~50% of in-person attendees. A good number of badges were distributed, and some people approached the stand requesting a button badge indicating the ‘crowd appeal’ of the UK-SCAPE logo.

Most visitors received one of the A6 cards designed to advertise the UK-SCAPE Digital Assets Catalogue. On one side, the cards had a visually appealing image featuring terrestrial environments from the UK-SCAPE portfolio of work: land, air, soil, water. They were designed to attract delegates to specific themes or areas of science e.g., land cover or biodiversity (Fig 8). The reverse side featured a short explanation of the research activity, a QR code and web link to the UK-SCAPE Digital Assets Catalogue (Fig 9). In total, 477 A6 cards were uplifted or given to delegates.

The series of postcards produced by graphic designer Kate Randall for the event.

Figure 8. Front of A6 cards given out at the UK-SCAPE stand, designed to advertise different datasets or data products.

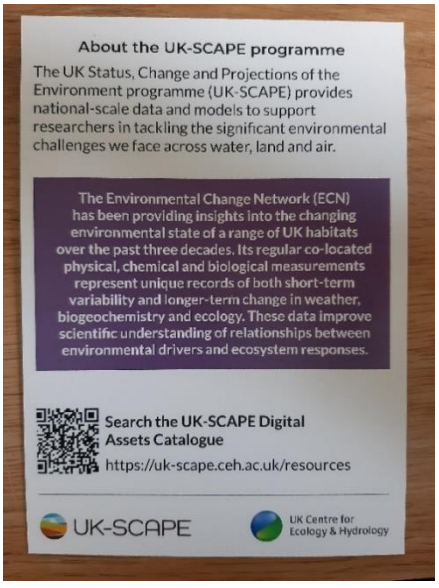

Figure 9. Reverse side of A6 card given out at the UK-SCAPE stand, each with a bespoke paragraph about the data/data product and QR code and web link to the UK-SCAPE Digital Assets catalogue.

Virtual Platform and Participation: The event organisers used the Whova mobile phone app to manage both in-person and remote audiences in the fully integrated hybrid event (Fig 10). The app provided virtual and in-person attendees with access to the event programme, including details of the exhibition stands, and some presentations.

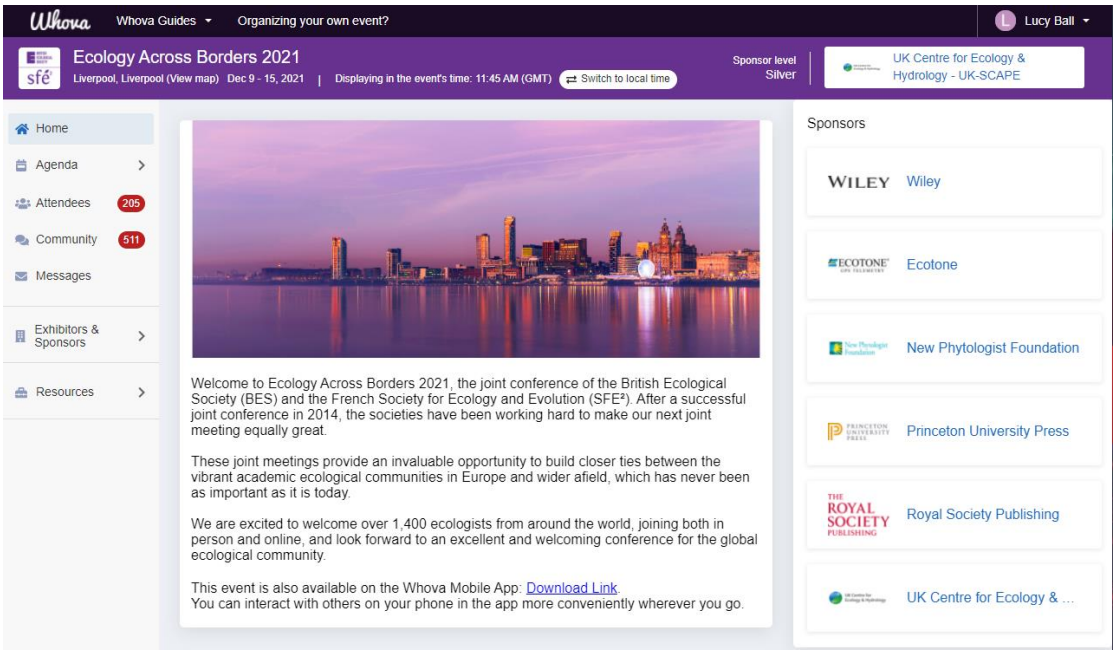

Figure 10 Screenshot of the BES event homepage on the Whova app

As an event sponsor, UKCEH had a “virtual booth” on the Whova app (Fig 11). It included various features to share electronic forms of UK-CEH and UK-SCAPE branded materials and to raise awareness about our involvement with delegates. The information provided through this outlet mirrored the stand and was successful in drawing all resources together to inform both the remote audience and attract delegates in Liverpool to visit the booth. Items included on the Whova app included:

- Introduction to UKCEH,
- Overview of the UK-SCAPE programme,
- Names of participating UKCEH staff
- Links to videos relevant UK-SCAPE science
- Images of postcards
- PDF versions of posters
- Links to both questionnaires

We were able to share web links to both the rapid data and DSF surveys but unable to identify how many accessed them via this route.

The online booth had a profile strength of 60% (as determined by Whova). We did not use all the available features such as “live product demonstrations” or “promotional offers” that are more applicable to commercial events. Overall, the online presence attracted 173 visits (number of times a delegate clicks on the sponsors page and enters the virtual booth), and 182,877 impressions (the number

of times a sponsor banner automatically rotates). We did not receive any online enquires or comments.

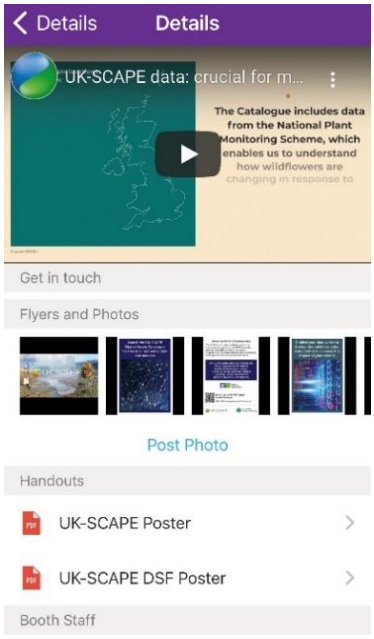

Figure 11. Screenshot of the UK-SCAPE virtual booth on Whova.

Rapid survey

The aim of this element of the research was to determine if the datasets and data products delivered by the UK-SCAPE programme met the needs of the community present at the BES meeting, and where possible, to co-design improvements.

We invited delegates to complete a rapid survey. This was completed on paper, which was distributed and collected at the event, or electronically by scanning a QR code or navigating to the survey site Surveys completed on paper were entered online by UKCEH staff, as this was the simplest way to create a complete data set.

Survey Design: The survey consisted of eight questions designed to raise awareness of UK-SCAPE data products (Appendix 1). It also was designed to determine participants views on potential for improvements, or if responds did not use UK-SCAPE data or data products, then to determine why not. In addition, we sought views on the mode of acknowledging third party data. The final four questions established information about the respondent: organisation, role, age group and gender. The only mandatory question was type of organisation.

Participants were invited to complete the survey by members of staff on the stand and by one staff member roaming around the exhibition hall and the various social spaces at the event. As expected, most interactions took place at coffee and poster sessions, although the people not attending a particular session were often happy to talk and complete the survey when approached in social or relaxation spaces. Small groups were frequently targeted, and all members asked to complete the survey. This proved to be a successful engagement strategy.

Each completed questionnaire is considered a discrete response.

Respondents and duration of response: In total 191 individual responses were recorded, 147 via the online survey tool (77%) and 45 on paper. The duration of the responses was calculated for the online submissions. Two respondents who started the survey during a coffee break apparently did not complete until after the sessions had started and the time taken to complete the survey was deceptively recorded as 01:28:48 and 00:20:56. When these anomalies were removed the average time to complete the survey was 03:47 min with a maximum 13:39 min and minimum 01:02 min.

The gender balance of respondents was roughly equal (97 identified as females, 88 as males with 6 declining to answer or preferring to self-describe (e.g., non-binary, gender-fluid, agender).

Half of the respondents were aged between 21 and 30 years of age (Fig. 12) with declining representation in subsequent age ranges.

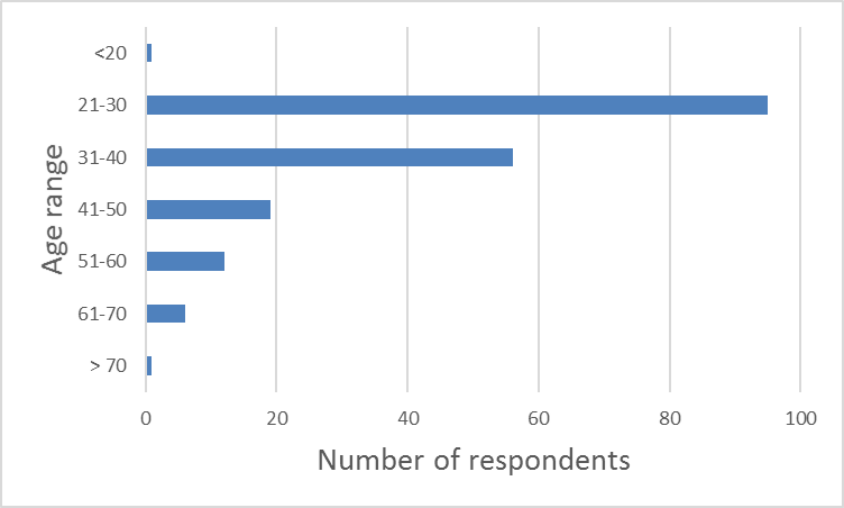

Figure 12. Age range of respondents

Most respondents (86%) were affiliated with a University (Fig 13). In total 19 respondents were affiliated to more than one organisation/institution.

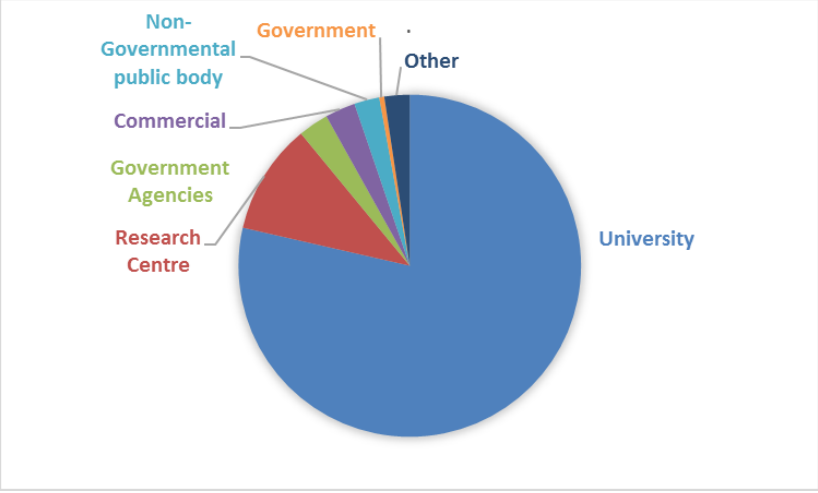

Figure 13. Affiliation of respondents.

A third (63) of the respondents self-identified as PhD students and a further 5 as Master students whilst 14 simply wrote student (Table 2). Just over 40 respondents described their role as Postdoc, Post-doctoral researcher/ scientist/ associate/ assistant/ fellow and others reported more senior academic role or specialism. Four respondents declined to report their role.

Table 2. Role of respondents (n=187)

Role	Count	% of respondents
PhD student	63	33.7
Post doc	40	21.4
Senior research	15	8.0
Student	14	7.5
Lecturer	9	4.8
Professor	7	3.7
Research fellow	6	3.2
Senior lecturer	6	3.2
Editor	5	2.7
Master student	5	2.7
Project manager /officer	3	1.6
Graduate	2	1.1
Junior researcher	2	1.1
Reader	1	0.5
Avian Telemetry specialist	1	0.5
Charity Communications Officer	1	0.5
Company director. Consultant ecologist.	1	0.5
Ecologist	1	0.5
Oceanographer	1	0.5
Retired	1	0.5
Spatial Analyst (Biodiversity)	1	0.5
Teacher	1	0.5
Undergraduate student	1	0.5

Discoverability and access to UK-SCAPE data products Overall, 56% of respondents did not use any of the 23 data sets or data products listed in the questionnaire. They were given a pen with the UK-SCAPE web address (https://uk-scape.ceh.ac.uk/) and one of the A6 cards with details of the UK-SCAPE Digital Assets Catalogue which contained the QR code and web address of the catalogue (https://uk-scape.ceh.ac.uk/resources). These responses evidence the impact of the survey (i.e., to raise awareness of publicly funded UK-SCAPE available data and data products to 105 individuals).

It was not clear how the 83 respondents used the data they selected from the list. At the upper end of the scale, one PhD student marked that he used 12 datasets (Fig.14) while a journal editor (61–70-years), a professor (51-60 years) and lecturer (31-40 years) all indicated that they used 7 datasets or data products from the list. The majority however indicated they used only 1 or 2 datasets or data products.

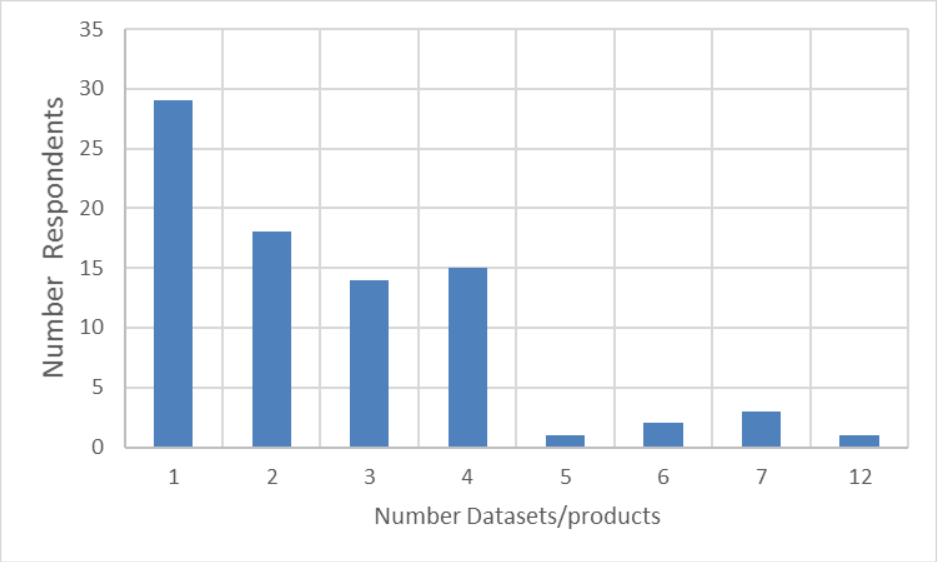

Fig 14 Number of data sets or data products respondents use in their research.

The Land Cover Map, Biological Records Centre and UK Butterfly Monitoring Scheme where the most used data products (Fig.15) chronicled by those who recorded use of UK-SCAPE data or data products (53%, 47% and 35% respectively). Several of the data products were utilised by less than five respondents indicating perhaps a mismatch with BES attendees and that further work is required to bring UK-SCAPE data to the attention of a wider environmental audience.

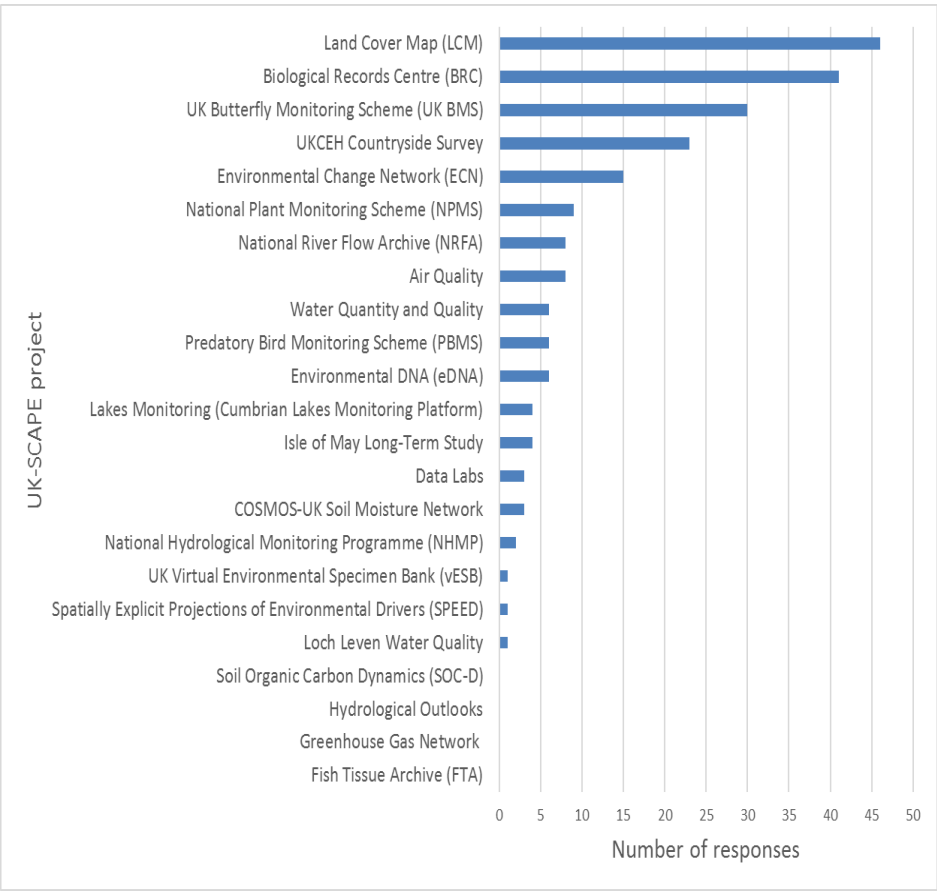

Figure 15. The number of respondents reporting they used specific UK-SCAPE projects' data/data products.

Approximately a third of respondents (28) provided suggested enhancements, which can primarily be considered in terms of (i) improved discoverability, (ii) value added access, and (iii) enhanced utility of the data products (Table 3). In terms of discoverability, one respondent specifically commented that air quality data was difficult to find while another encouraged further advertising at events like the BES meeting. This feedback has resulted in the team considering advertising in the quarterly BES magazine The Niche and participating at more thematic events.

In terms of access, several respondents requested improved visualisation - the ability to view raw data and download the section that was of interest. This preference was to speed up the investigative process and reduce the size of datasets to be downloaded and stored. This request echoes the results of stakeholder consultation (Dick & Massimo 2021; Kay *et. al*. 2021; Rennie *et. al*. 2020). Thankfully, this ability is already available for some of the data sets and when this recommendation was voiced, the delegate was directed and introduced to Pete Henrys on the stand who explained and demonstrated the Data Lab, which provide improved access to UK-SCAPE data (see section 3 of this report). A respondent also suggested R package for access in association with BRC data sets. This suggestion also appeared in another study (Dick & Massimo 2021) when users of the air quality dataset EMEP4UK gridded UK atmospheric composition data where consulted. As the academic community is now committed to the use of R as a coding language, the UK-SCAPE team ensure the Data Labs support this programming language

Two respondents commented that tutorials would be useful, duplicating responses to the survey reported in section 3.

The need to formalise access was commented on by some respondents who currently gain access directly from a UKCEH member of staff. The transmissibility of data became apparent when one respondent noted a desire to download information only once and distribute to students. Whilst this individual recognised the need to credit UKCEH in order to evidence the need by the research community for the long-term monitoring data sets produced in the UK-SCAPE programme, this message was continually reinforced over the 4 days. In conversation, this respondent considered a persistent digital object identifier (e.g., DOI number) would allow this but acknowledged the limitations in demonstrating evidence of use if only published as a thesis or student project report compared with multiple downloads by individual users.

Table 3. Suggested improvements to the access and delivery of UK-SCAPE datasets and data products.

Theme	Respondents' text
Discovery	Advertise at events like this
Discovery	Air quality data is hard to find, especially the temporal trends at 10 km scale.
Access	Access portal quicker
Access	Improve accessibility and permissions!
Access	It took a long time to gain access when it was updated
Access	Make visibility/access to long term N deposition data easier
Access	At the moment we get the data rather informally by emailing and waiting... not a very efficient system.
Access	I would like to be able to only download once and share within my group while still crediting CEH when needed

Access	Access to data bases through dedicated R packages removed entry barriers
Access	For BRC, it's quite confusing to know how to access/what is available - R package for access?
Tutorials	I had help learning how to use the data base from my supervisor, but I would have found it difficult to use had I not had this training available.
Tutorials	More user-friendly front end that is easier to navigate/understand as non-specialists.
Pre-view	Data pre-views would be good
Pre-view	Viewing online
Pre-view	Data previews would be good - overview of data before download
Pre-view	LCM - student struggling to deal with sheer size of data set
Pre-view	Data Lab to view & download data - only part of data I want would be great - viewing online
Pre-view	Improve the ability to select areas specific within the maps and extract the information
Utility	Export function to get associated metadata
Utility	BRC - Mismatch in data between users or sources - makes it difficult to code in R
Utility	Confusing to get datasets to talk with each other - iRecord and BRC do not talk with each other. Make it easy for recorders - need a simple app system
Utility	Countryside Survey data locations need to be made available (by request of MoO). Also, the freshwater portals could be better linked by site identifiers.
Utility	Frustrating that Wales, Scotland and England maps have different metrics. Need to get all the govs. to collaborate and ensure the data collected and the parameters are the same.
Utility	In consistencies between observations in time between sites
Utility	Observation time not standard
Utility	Spatial resolution of BRC could be better
Utility	The move to Edina has been a great thing for the ones I use. More comparability between different products produced in different years would be fab.

Reasons for non-use of UK-SCAPE data products. Almost equal numbers of the respondents who did not use UK-SCAPE projects' data products reported they were not aware of their existence (50) or they were not relevant to their area of science (46). Eight respondents declined to answer the question. The fourteen individuals who stated the data was not relevant to their area of science reported that their study area was outside of the UK e.g., France, Finland, Sweden and Antarctica. Five early career researchers commented they did not currently use UK-SCAPE data products but might in the future, examples include: *"I probably will use some but am early on in the PhD"* and "*I only recently moved to the UK, so I used data from other geographical areas I am excited to use these data in the future though."*

Seven participants reported they did not require environmental data for their work mentioning human health and social science research for example, "*I am concerned with infection diseases use GIDEN, WHO and CDC* and *I'm a quantitative social scientist - I don't really use data sets".*

One female PhD student who reported using the Land Cover Map also wrote in the space provided for reasons of non-use "*I didn't realise that the Isle of May long term dataset was available for use"*. While another wrote "*I'd love to hear more about the datasets through talks/posters at conferences such as the BES!"* Further reinforcing the need to advertise UK-SCAPE datasets/ data products.

Acknowledging third party data. Most respondents who considered acknowledging third party data as desirable, selected Option 1, "Always" to the question "Do you acknowledge third party data/ data products used in generating your own research".

In order to investigate if there was a difference in role and age of respondents to this question, 191 responses were re-grouped using reported age, role and institution/organisation into four classes by means of the following criteria (Fig.16):

- Student: less than 41 years of age with stated role such as student, PhD student/researcher/scientist, recent undergraduate (n=85).
- Post-Doctoral: age group 21-40 years with stated role such as post-doctoral researcher assistant/fellow, lecturer, research associate (n=55).
- Senior academic: over 41 years of age with stated roles of Advance researcher, Associate Professor, Emeritus researcher; Professor, Senior researcher, independent researcher (University) Group leader/PI (Government agency) n=35).
- Other: all others which included commercial publishing/consultants, NGO, management, role unreported (n=16).

As a group, post-docs were the most likely to acknowledge third party data (80%) while those classed in the 'Other' category were the least likely to acknowledge third party data primarily because they did not use third party data (Option 4).

Investigation of the 25 respondents who selected Option 2, "Sometimes" or Option 3. "Never" (13, 5, 4, 3 for the groups students, senior academics, post-docs, others respectively) revealed that they also did not use third party data or had not yet published. For example, a student who selected "Option 2. Sometimes" wrote, "*I'm not sure as I have not yet published or presented my research".* Another student suggested it was not always possible to acknowledge third party data commenting, "*Difficult to acknowledge as time limited e.g., 12 min in BES [presentation]. Sometimes word and time limited but can put on slide".* While a senior university academic who also selected the Option 2, "Sometimes" wrote, "*Very happy to in principle but this is a bit of a wild west area still lacking conventions".*

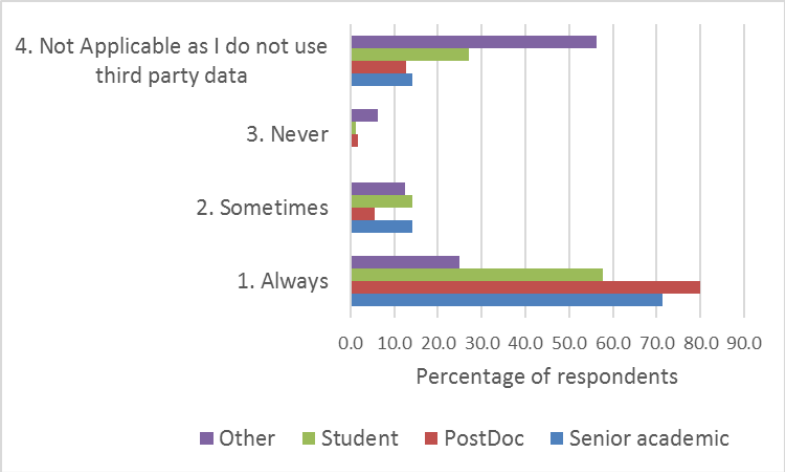

Figure 16. Response as a percentage of respondents grouped by their reported age and role who answered the question "Do you acknowledge third party data /date products used in generating your own research?" n=191.

The majority of respondents selected that they either did or would acknowledge third party data in the acknowledgement section of a peer reviewed paper/report or cite the data source (Fig. 17). A higher proportion of senior academics reported they would acknowledge third party data in all categories offered except Option 2. *The data are cited using e.g., the Digital Object Identifier (DOI)* which may reflect that early career research tend to use other data compared to more senior colleagues.

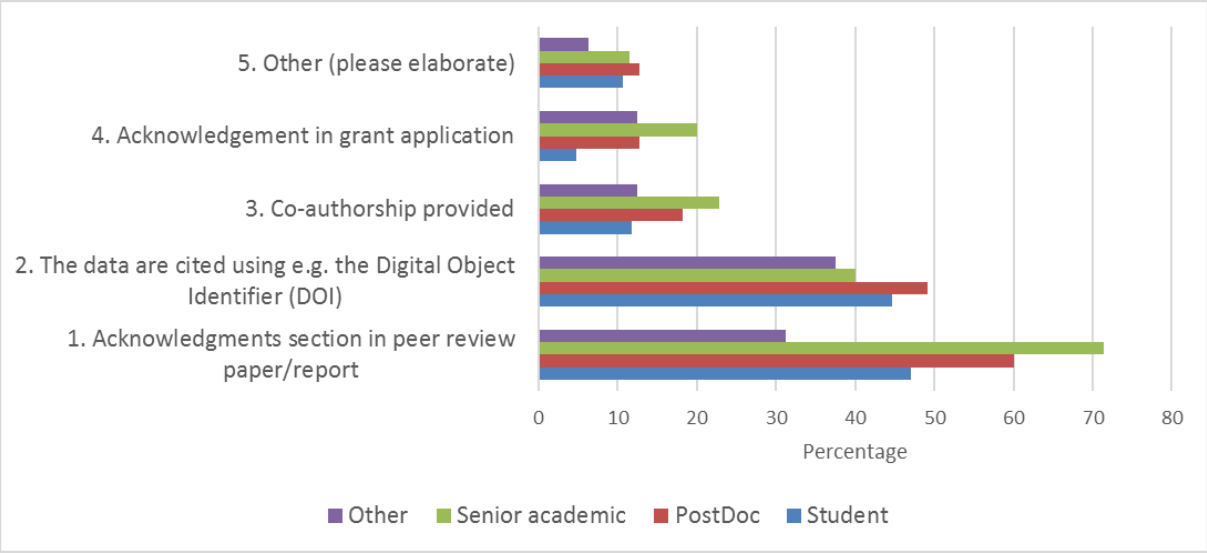

Figure 17. Proportion of respondents answering the question "Do you acknowledge third party data/ data products used in generating your own research?".

The few who suggested another form of acknowledgement tended to opt for using the methods section. For example, one stated they would do the following, "*link in the text e.g., a web link in methods if no DOI or citation format provided* or in presentations *Fig legend say data from, PowerPoint slide".*

The majority (60%) of respondents who answered the final open Question 8 "Please explain further your attitude to third party data e.g. when would you consider it not appropriate to acknowledge the source of third party data" repeated that they always considered it important to acknowledge third party data. A few respondents considered it simply good manners to acknowledge third party data e.g., "*often in grant applications working in collaboration it is polite and gives the grant application credibility"*, Another wrote, "*I am at the beginning of my PhD and use a lot of third-party data, I am always careful to acknowledge it because that seems to be the safest way not to upset anyone. I don't know much more about the proper etiquette".* While a post-doc wrote "*Very important to be acknowledged and often if heavily involved in our research to be included in authorship. These networks are vital".* Another echoed this sentiment, "*It is very important to acknowledge third party data, much research relies on it, and even if it's freely available, it is not free to produce".*

While the majority considered acknowledging third party important, offering co-authorship was not considered important. For example, "*It's always appropriate to acknowledge and should be done by citation. Sometimes invite as collaborator if it is relevant (e.g., filling experience gap) - wouldn't automatically give co-authorship without contribution".* While another wrote *My belief is that third party data should always be cited/acknowledged but if it's in the public domain then co-authorship is not compulsory*

While an older professor commented that he would offer colleagues who worked for organisations such as BTO co-authorship, but he considered publicly funded researchers did not require co-authorship it was only necessary to cite the data. When questioned further he considered that NGO's such as BTO often required academic help to publish their research.

Only a few respondents admitted there were occasions when they may not acknowledge third party data. The two most dominate themes were (i) dependency on the quality or quantity of data e.g., if only used for "*exploratory purposes"* or if "*data have been produced by co-authors"* or "f*ree after publication"* and (ii). restrictions by journals or session organisers (Table 4). A few could envisage being asked not to acknowledge data and two considered they should not acknowledge third party data "*If data is protected/embargoed e.g., endangered species"* or publishing would "*put the providers at risk".*

Table 4 Occasions when respondents suggested they might not acknowledge third party data

Theme	Respondents' text
Quality/quantity	*Depends on quantity and use of data*
Quality/quantity	*Only when used for exploratory purposes perhaps. I.e., the data nor any products out of it are included in the final work.*
Quality/quantity	*If I was the one who collected the data in collaboration with the third party.*
Quality/quantity	*If only v small amount used*
Quality/quantity	*When data have been produced by co-authors*
Quality/quantity	*Free after publication*
Journal/presentation	*Concerned when publishing in journals as they seem to want new data not link to other datasets*
Journal/presentation	*Requirement of journal has mitigated against recognition of data.*
Journal/presentation	*We do not know how to reference data properly. Do not have agreed upon method*
Journal/presentation	*Journal space limits constrain the extent to which I can correctly cite the associated reports/papers behind these (in a digital era no idea why). Dataset DOIs are a great thing as well, as institutional pages always change.*
Journal/presentation	*Difficult to acknowledge as time limited e.g. 12 min in BES. Sometimes word and time limited but can put on slide*
Requested	*If I was asked not to*
Requested	*Only don't acknowledge when data owner asks me not to*
Requested	*only would not acknowledge if owners did not wish it*
A risk	*If data is protected/ embargoes e.g. endangered species*
A risk	*If it puts the providers at risk*

Around a third of respondents who reported they currently use a UK-SCAPE data product were aware that the data was hosted by EIDC; while10% reported they were aware of EIDC but do not currently use UK-SCAPE datasets or products.

Actions. Action points arising from the survey include:

- Consider advertising access to datasets more widely e.g., science magazines, attendance at more science events.
- Ensure all datasets lodged in appropriate repository that issues a persistence object identified e.g., EIDC and encourage UKCEH staff to stop providing data by other means e.g., downloads from project websites.

3 Co-designing improvements to the UK-SCAPE data science framework

3.1 Strategy for engagement

The logic model framework was completed by Pete Henrys prior to attending the event.

1. Why engage

- The aim is to use the UK-SCAPE funded stand at the BES meeting to promote the developing Data Science Framework (DSF) to a wide audience of potential users, to obtain feedback on the current development and to understand future requirements and priorities for development.

2. Who are we targeting?

- Target audience are those active in environmental research who use data.

3. How to engage

- Postcard with DSF overview on it and link to an online survey form.
- Virtual Survey Lab poster.
- Laptop and monitor for an interactive demonstration.

4. With what impact

- Researchers will be aware of the data science developments being funded and delivered under NERC National Capability that they will benefit from.
- Feedback received from users will help to shape the developments of the DSF and our priorities going forward.
- More organisations/individuals aware of the DSF and Data Labs, maximising the usage and value for money for UKRI.

5. With what evidence

- Collect contact details of people/organisations who express interest in participating in future DSF workshops.
- Make notes of all feedback received on the project and on the interactive display.
- Quick survey questionnaire for delegates to determine what they want from the DSF and their main challenges.
- Use the ‘UK-SCAPE button badge’ to estimate total interactions with visitors to the stand.

3.2 Results of engagement

Over the duration of the event, there were over 50 conversations with delegates about the data science framework. It was a good opportunity to explain what the data science framework was and how they, as researchers, may benefit. Most conversations were with PhD students, who are often dealing with, manipulating and

analysing data and these interactions with early career scientists was viewed as beneficial and informative.

The conversations often involved a discussion about the problems faced by researchers when analysing data, particularly those steps that take a long time to execute. Some conversations resulted from initial conversations with other members of the stand who then redirected the delegate to discuss the DSF in more detail. Examples of this included when feedback from the rapid survey related to data access and the DSF was presented as a follow-up to show some examples of what work is underway to address this issue and what is already in place. When solutions from the DSF were presented, the overwhelming response was positive, and many commented on how much time it could potentially save.

Comprehensive demonstrations were given to a handful of delegates to show the capabilities of the DSF and to explain some of the tools already developed. The responses were very encouraging with most delegates seeking access to the service as soon as possible. All delegates took away a postcard outlining the data science framework, information on how to contact us and a link to the questionnaire.

The questionnaire, shown in full in Appendix 2, sought to understand the main data science challenges that researchers are facing, how beneficial certain developments within the DSF may be to them, what they saw as the priorities to address some of these challenges and the specific formats they would like solutions presented.

Feedback from the 39 completed questionnaires is incredibly useful for developing further work within UK-SCAPE. The biggest challenge when analysing environmental data is access to the data (64.3%). The next biggest challenge, as stated by respondents, was combining and harmonising data from different sources (50%).

Asked whether the ability to access large, high resolution, complex data sets was a significant barrier to achieving their research, over 50% of respondents stated that it was either a complete barrier or a significant issue.

We asked respondents whether standardisation and integration of different data sets would save time during analysis. The pie chart below (Fig 18) shows the responses received and how an overwhelming majority agree.

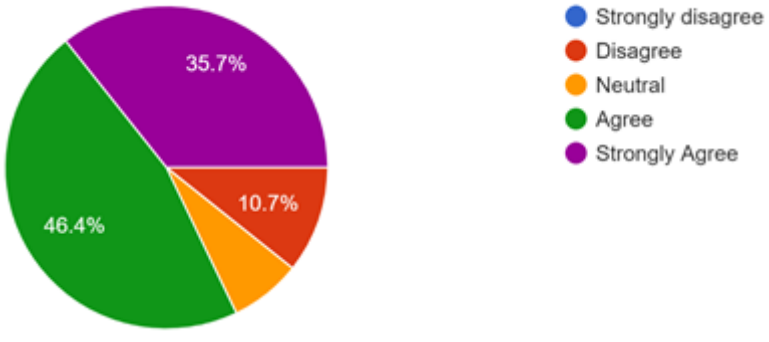

Figure 18. Response to “will standardisation and integration of different data sets would save time during analysis”.

To understand what the DSF could do, or which actions to prioritise to maximise the impact with researchers, we asked what they would find most useful to facilitate their research both now and in the future. Three options were presented with an ability to

add further options should they wish. All chose from the three options presented and the results are shown below (Fig 19). There isn't really a clear answer, and it seems that some prefer certain resources over other. What it does demonstrate is that the more examples we can provide the better: whether they are tools, tutorials, or learning resources.

Figure 19: Response to what would be most useful to facilitate research both now and in the future.

A major development under the DSF is the Data Labs infrastructure. We therefore asked whether access to online, collaborative cloud environments, providing access to data and computational resource, would improve the way they conduct scientific research. The responses are shown in the pie chart below (Fig 20) whereby the majority of respondents agreed that they would improve their science (78.5%) and that no one disagreed that their scientific research and outputs would be improved by the type of infrastructure being developed by Data Labs.

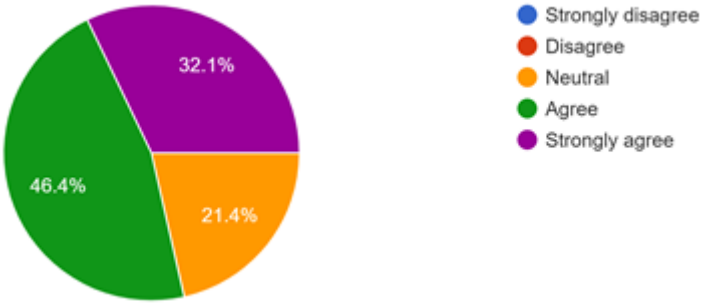

Figure 20. Response to whether access to online, collaborative cloud environments, providing access to data and computational resource, would improve the way they conduct scientific research.

Overall, the discussions at the event and feedback received from the questionnaire provide the confidence, support and evidence that what we are doing is valued by the community and something that they will certainly benefit from.

4 Widen the existing NERC Knowledge Exchange partnership

4.1 Strategy for engagement

The logic model framework was completed by Francesca Mancini prior to attending the event.

1. Why engage

- The aim is to use the UK-SCAPE funded stand at the BES meeting to widen the existing Knowledge Exchange partnership amongst an appropriate audience.

2. Who are we targeting?

- Seeking to engage with governmental and non-governmental conservation organisations, data holders and land managers, who want to use their data/available data to produce assessments of biodiversity status at a national and/or local scale.
- I will also engage with other researchers who enter the stand. The aim of the engagement with the academic community will be to establish contacts with researchers who might be available to contribute their knowledge and expertise should the KE partnership highlight it as one of their key needs.

3. How to engage

- Poster about the Knowledge Exchange project.
- Laptop for an interactive display: a Shiny App displaying customisable visualisations of biodiversity trends based on model outputs produced by researchers at BRC; Data Labs project notebooks (RStudio and JupyterLab) to demonstrate how to use the platform.

4. With what impact

- More organisations aware of NERC science in the area of biodiversity monitoring.
- More organisations aware of UK-SCAPE Data Labs.
- More organisations aware of the Knowledge Exchange project, who can be engaged in future workshops and events.
- Wider stakeholder base to identify priorities for knowledge exchange within the conservation community**.**

5. With what evidence

- Collect contact details of people/organisations who express interest in participating to the Knowledge Exchange project
- Make notes of all feedback received on the project and on the interactive display.
- Use the ‘UK-SCAPE sticker badge’ to estimate total interactions with visitors to the stand

4.2 Results of engagement

Most of the interactions at the stand and other conference spaces were with academics, which was expected given that most BES attendees are affiliated with universities and research institutes. Despite this, four individuals from non-academic institutions left their contact details to be added to my mailing list, which means four potential new partner organisations joining the Knowledge Exchange partnership. Three of the four organisations are charities working on nature conservation and one was a citizen science initiative. I also talked about the project to around 30 academics, mostly early career researchers but also some more senior academics.

The stand provided a focal point to attract BES attendees to the display and engage them in conversation, as a result I most likely engaged with more people than if I had only attended as a delegate. Conversations were mainly focused on the challenges associated with analysing citizen science biodiversity data, suggesting that this Knowledge Exchange project is very timely. Engagement with conservation practitioners highlighted the importance of giving conservation organisations access to the research methods and tools that allow robust biodiversity trends to be derived from multiple sources of data, with the majority coming from opportunistic sampling and citizen science schemes.

Feedback on the tools demonstrated (the Shiny App and the DataLab notebook) was very positive, with all the non-academics I engaged with stating they would be very valuable for their organisation. A few of the delegates asked for a flyer or other promotional material to learn more about the KE project, which I did not have available. I am now working on a website to promote the project and I will produce promotional material for any future event.

Overall, the engagement at the stall was very valuable in terms of confirming the value of the project's aims and the suitability of the tools that will be developed. Ultimately, the engagement activity achieved its main aim of widening the network of stakeholders, who I will be able to further engage over the lifetime of the project.

5 Suggested improvements for future events

Although the event was considered very successful, a few learning points are noted here which may be useful for others conducting similar engagement activities.

1. The button badge approach to obtain the total number of interactions has worked well at several day events (e.g., Dick *et al* 2021) but was considered inappropriate for multi-day events. Staff on the stand noted daily totals in a notebook. It was not easy to determine who had been approached on previous days (people were wearing masks and they changed their clothes). If using this method, preparation to evaluate the number of stickers used is required (e.g., split stickers into groups of 10 and allocate to staff members, ideally with initials on the base sheet for collection later).

2. There was no attempt to quantify the number of people watching the videos. This element was not in the original plan and there was no mechanism to evaluate stakeholders' interaction. In future, someone could observe delegates for a set period could be one mechanism (i.e., count those watching and note the duration).

3. The stand could not be erected as planned because there were three open sides (planned for two) which meant there was no space for the UK-SCAPE banners to form a backdrop. Staff solved this problem by 'wrapping' the banners around the corner posts. This was only feasible because the event organiser, Alice Hope, had the foresight to pack a range of adhesive materials.

6 References

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7 Acknowledgements

The authors are grateful to all the people who took the time to visit the stand, take part in the activities and share their knowledge with the team. We are also indebted to all the participants who allowed their photographs to be taken and gave permission for them to be included in this public report. Every photograph was shown to the individuals and many remarked that they were happy for their faces to be shown; however, we have selected images where participants faces are not recognisable. The team are indebted to Alice Hope, UKCEH Public Engagement and Events Coordinator, for all her support and encouragement. Francesca Mancini's attendance was supported by the NERC Knowledge Exchange Fellowship NE/V018973/1.

Appendix 1. Rapid Survey and Information Sheet for Participants

The rapid survey was provided both on-line and as a paper version. An example of a paper version is provided, the online version was provided as a QR code with the Participants Consent and Information Sheet (see below survey).

Rapid Survey BES meeting 12-15 Dec 2021

Id # Date

Start Time Finish Time

1. Which of the following UK-SCAPE projects' data/data products do you use?

1. Air Quality
2. Biological Records Centre (BRC)
3. COSMOS-UK Soil Moisture Network
4. UKCEH Countryside Survey
5. Data Labs
6. Environmental Change Network (ECN)
7. Environmental DNA (eDNA)
8. Fish Tissue Archive (FTA)
9. Greenhouse Gas Network
10. Hydrological Outlooks
11. Isle of May Long-Term Study
12. Lakes Monitoring (Cumbrian Lakes Monitoring Platform)
13. Land Cover Map (LCM)
14. Loch Leven Water Quality
15. National Hydrological Monitoring Programme (NHMP)
16. National Plant Monitoring Scheme (NPMS)
17. National River Flow Archive (NRFA)
18. Predatory Bird Monitoring Scheme (PBMS)
19. Soil Organic Carbon Dynamics (SOC-D)
20. Spatially Explicit Projections of Environmental Drivers (SPEED)
21. UK Butterfly Monitoring Scheme (UK BMS)
22. UK Virtual Environmental Specimen Bank (vESB)
23. Water Quantity and Quality
24. None of the above

2. Do you have suggestions to improve any aspect of the delivery of these datasets/data products?

If yes please explain

3. If you do not currently use any of these datasets/data products can you say why?

1. Not applicable as I do use some of these datasets/products
2. I was not aware of their existence
3. Not relevant to my area of science
4. I use equivalent datasets/data products from other organisations
5. Other (please specify)

4. If you use other datasets/data products (option 4 above) or have another reason for not using UK-SCAPE datasets/products (option 5 above) can you please elaborate to help us improve our delivery?

5. UK-SCAPE delivery is through the Environmental Information Data Centre (EIDC) – have you heard of that centre?

6. Do you acknowledge third party data/data products used in generating your own research?

1. Always
2. Sometimes
3. Never
4. Not Applicable as I do not use third party data

7. How do you acknowledge the use of third-party data resources? (Please select all that apply)

1. Acknowledgments section in peer review paper/report
2. The data are cited using e.g., the Digital Object Identifier (DOI)
3. Co-authorship provided
4. Acknowledgement in grant application
5. Other (please elaborate)

8. Please explain further your attitude to third party data e.g., when would you consider it not appropriate to acknowledge the source of third-party data.

To inform our analysis can you please tell us:

9. The type of organisation/institute you are affiliated with?

1. University
2. Government
3. Government Agencies
4. Non-Governmental public body
5. Research Centre
6. Commercial
7. Other

10. What is your role e.g., senior researcher/student?

11. What is your age group?

Less than 20 years

- 21 - 30 years
- 31 – 40 years
- 41 – 50 years
- 51 – 60 years
- 61 – 70 years
- 0ver 70 years
- Prefer not to say

12. How would you describe your gender?

1. Male (including transgender men)
2. Female (including transgender women)
3. Prefer not to say
4. Prefer to self-describe (e.g., non-binary, gender-fluid, agender, please specify)

13. Is there anything else you would like to add to help us improve delivery of long-term environmental datasets and data products?

Thank you for taking the time to co-design improved delivery of UK environmental datasets and data products

Participant Information Sheet

UK-SCAPE Data Delivery Rapid Survey at BES meeting Liverpool 12-15 Dec 2021

You are invited to participate in a rapid survey for UK Status, Change and Projections of the Environment Programme (UK-SCAPE).

This *Participant Information and Consent Sheet* explains the procedure. This will help you to understand why and how the research is being carried out and what participation will involve. Please contact Dr Jan Dick (jand@ceh.ac.uk), if anything is unclear or you have any questions.

Who is conducting the research?

Representatives of UK Centre for Ecology and Hydrology (UKCEH). The key contacts from the project team are Jan Dick (jand@ceh.ac.uk), Lucy Ball (lball@ceh.ac.uk, and Jake Quinn ((jakqu@ceh.ac.uk), UK Centre for Ecology and Hydrology.

Who is funding the research?

The UK-SCAPE programme started in 2018 and is funded by the Natural Environment Research Council as National Capability (award number NE/R016429/1).

What is the purpose of the research?

The aim of this research is to if determine the datasets and data products delivered by the UK-SCAPE programme meet the needs of the community present at the BES meeting and to co-design improvements.

Do I have to take part?

No. Taking part in this knowledge sharing activity is completely voluntary and deciding to not take part will not disadvantage you in anyway.

What will happen if I take part?

Participating will entail completing an anonymous rapid survey. Your data will then be combined with all other responses and analysed to inform UK-SCAPE data delivery.

Are there any risks in taking part?

There are no risks to taking part in the interview, which the research team can foresee. The research team are not part of the UK regulatory agencies.

What are the possible benefits of taking part?

There are no immediate direct benefits to taking part in this project; however, we hope that following analysis of results UK-SCAPE programme will better service the environmental sector of the UK and further afield.

Will my taking part in this project be kept confidential?

Yes - UKCEH will present only anonymised data.

What will happen to the information I provide?

The information you provide will be captured electronically or on paper. The data will be stored to support analysis and any potential future publication documenting this co-production process. We intend to archive the anonymised data for future research use; however, there will be no way for these data to be linked to project participants.

Data Protection

No personal data will be collected.

If you wish to complain about the use of your information, please contact the UKCEH's Data Protection Officer in the first instance (email: Quentin Tucker, Data Protection Officer quetuc@ceh.ac.uk). You may also wish to contact the Information Commissioner's Office (https://ico.org.uk/).

Please scan code to complete survey

or navigate to

https://ceh-online-surveys.onlinesurveys.ac.uk/uk-scape-rapid-survey-bes-dec-2021

Figure 21. Scenes from roving survey completed online and in paper.

Appendix 2. Data Science Framework Survey

We would like your feedback on issues related to the development of our Data Science Framework. This will be incredibly useful for shaping its development and for prioritising key areas of focus. By participating in this survey, you will help to ensure that the UK-SCAPE Data Science Framework is of maximum benefit to the user community and addresses the key challenges faced. All feedback is completely anonymous and is very gratefully received.

Challenges

1. What do you see as the biggest challenge(s) when analysing environmental data? (Please tick all that apply)

   - Accessing data
   - Assessing the quality of data
   - Finding data
   - Combining and/or harmonising data from different sources
   - Finding suitable analytical methods for understanding complex data
   - Applying complex analytical methods
   - Accessing suitable computational resource for high volume storage
   - Accessing suitable computational resource for processing and analysis
   - Other:

2. The UK-SCAPE Data Science Framework is working on a number of developments to address these challenges. Which would you find most useful? (Please tick all that apply)

   - Data access via Application Programmatic Interfaces (APIs)
   - Web-based data portals to visualise and query data
   - Freely available cloud-based analytical facilities
   - R packages to enable data harmonisation and integration approaches
   - R packages for accessing data (e.g., via APIs)
   - R packages for quality assurance of data
   - R Shiny applications to provide user friendly access to above mentioned R packages
   - A series of high resolution spatial and temporal data products freely available

Data Access

3. Does the ability to find appropriate data hinder your research? *Mark only one on 5-point scale*

   No, does not cause any issues
   - 1
   - 2
   - 3
   - 4
   - 5

   Yes - can often be a total barrier or require significant time to overcome

4. Is the ability to access large, high resolution, complex data sets a significant barrier to achieving your research? *Mark only one on 5-point scale.*

   No - does not cause any issues
   - 1
   - 2
   - 3
   - 4
   - 5

   Yes - can often be a total barrier or require significant time to overcome

5. Are there any datasets that you commonly use that you find difficult to access? If so, please state.

6. Accessing data programmatically will improve the way I conduct scientific research *Mark only one.*

   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

7. Standardisation and integration of different data sets would save me time during analysis. *Mark only one.*

   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

Data Analysis

8. What are the main analytical techniques that present particular challenges to your research? *Check all that apply.*

   - Multivariate analyses
   - Spatial analyses
   - Time series analyses
   - Data integration techniques
   - Bayesian statistics
   - Mixed effects models
   - Non-parametric analyses
   - Machine learning
   - Experimental design
   - Other:

9. What would you find most useful to facilitate your research both now and in the future? *Check all that apply.*

   - Simple, user-friendly tools that enable me to undertake complex analyses
   - More tutorials and vignettes providing examples of particular analyses
   - A dedicated and curated online space linking to resources, including tools, tutorials and code, across multiple sources

10. Creating new data products at greater temporal and/or spatial resolution has the potential to improve the science I can do and the impact it may have. *Mark only one oval.*

    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree

11. I would like to access new analytical tools as... (please tick all that apply) *Check all that apply.*

    - Raw R scripts
    - Raw Python scripts
    - Jupyter notebooks
    - A bespoke R package
    - A bespoke Python library
    - R Shiny application
    - Web applications
    - Other

12. Tools for automating the quality assurance of different data sets would be useful for the work I do. *Mark only one oval.*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Analytical and computational environments

13. A web-based analytical environment (such as R studio, Jupyter notebooks) with data already loaded, will be beneficial to the science I do. *Mark only one oval.*

    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree

14. Access to online, collaborative cloud environments, providing access to data and computational resource, would improve the way I conduct scientific research and the outputs I generate. *Mark only one oval.*

    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

15. Access to computational power can be a limitation when analysing data. *Mark only one oval.*

    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree

16. Please feel free to add any other comments or features you would like to see developed by the UK-SCAPE Data Science Framework.

Appendix 3. Event Plan

The logic model framework was completed prior to attending the event – *changes to the original plan are noted in italics.*

Why engage? What difference are we trying to make?

- Raise awareness of publicly funded UK-SCAPE available data and learn how delivery and environmental monitoring can be improved.

Who are we targeting? *Who are we trying to engage with UK-SCAPE research?*

- A wide range of 'potential data users' includes those that need/want monitoring data and model data products

How to engage*? What methods will we use to engage people with UK-SCAPE research and when?*

- We are targeting attendees at the British Ecological Society annual meeting, 12-15 December 2021, Liverpool, UK, because they are a diverse gathering of the target audience for UK-SCAPE data products (early career and senior academics, practical conservations, a range of governmental (GO) and non-governmental organisations (NGO).

How will we maximise involvement with the event?

- Write a blog prior to the event for UK-SCAPE website and Tweet about the forthcoming event. *Blog not written as it was uncertain that in-person attendance would be possible due to COVID situation. However, a virtual booth was created within the online delegate pack (Whova app) and presence communicated via Twitter.*

- By taking a stand/booth (4m x4m) UKCEH will appear as a sponsor within the delegate information pack.

- We will submit an entry to the Poster Session to raise awareness of the availability of publicly funded UK-SCAPE data, and to highlight the UKCEH stand/booth. The poster will be in French and English to maximise interest (event co-hosted with French Society for Ecology and Evolution). *Poster only produced in English as travel restrictions in place and French delegates attended online.*

- By having signage highlighting 'free environmental data', we hope to attract people. Many of the UK-SCAPE data products already have branding – this will be used in addition to UK-SCAPE branding and signage – because people may be attracted by 'established and familiar branding.

- People engaging in longer 'significant' exchanges e.g. they complete the rapid survey, will be offered a 'free eco-friendly gift' of a pen with the UK-SCAPE web link thus providing access to the data after the event.

- A6 Postcards with the website and a list of data/ data products will be displayed for pick up and actively given to interested people.

What will be on the stand?

- Anticipate two 45" screen; one showing UK-SCAPE-UKCEH video's and the other to demonstrate UK-SCAPE data and data products. *In fact, only one 45" screen was rented to show videos. UKCEH monitors were used for demonstrations (saved resources).*

- Pete Henrys, representing the Data Science Framework aspects of UK-SCAPE (see section 3)

- Francesca Mancini, representing the biodiversity aspects of UK-SCAPE focused on Data Labs and her Knowledge Exchange partnership

- Additional staff members to greet visitors and provide information on the UK-SCAPE programme and its outputs (Lucy Ball and Jake Quinn).

- Posters highlighting data and data products available

- A6 postcards using eye-catching images and design to illustrate the breadth of UK-SCAPE science across the terrestrial environments of land, air, water and soils. Each postcard included information on where toto access UK-SCAPE data and data products.

With what impact?

What do we hope will change as a result?

- Increased number of people aware of UK-SCAPE data and data products
- Increased downloads and enquiries
- UK-SCAPE scientists will learn to provide 'better' data products by understanding users
- UK-SCAPE scientists will co-design better data delivery mechanisms by understanding users

With what evidence?

How can I evidence that change?

- Button badges will be given to people entering the stand/booth and everyone whom the team interact with (count button badges given out)

This system which has worked well on single day events was not effective in this multi-day event. Staff recorded number of interactions in a book

- Increase in number of people aware of UK-SCAPE data and data products. Determined by rapid survey i.e., total who indicate they have not heard that UK-SCAPE data is available – they will know after taking part in the survey so can calculate increase. Also, everyone answering the survey will be given pen and A6 postcard as a reminder how to access the data - so will be aware of UK-SCAPE data and data products after discussion.
- Analysis of the rapid survey that will specifically ask people to offer their opinion.
- Number of people who have significant engagement (> 2 min) counted as those receiving 'branded gift' with web links plus documentation of their views in report lodged in NORA. *(This report).*
- We will keep a BES UK-SCAPE notebook on the stand/booth and encourage all UKCEH team members who interact with attendees to write down interesting or funny comments or interactions in the project notebook daily as a means of capturing feedback in addition to the responses to the 'rapid survey'. *This system failed as viewed as unnecessary by staff on the stand.*

Appendix 4. Virtual Presence

Information provided on the Whova Phone App.

The UK Centre for Ecology & Hydrology is an independent, not-for-profit research institute carrying out excellent environmental science with impact. Our 500 scientists work to understand the environment, how it sustains life, and the human impact on it. We provide the data and insights that governments, businesses and researchers need to create a productive, resilient and healthy environment. Scientific curiosity, integrity and transparency are at the heart of how we work.
UKCEH Video: https://youtu.be/-F0mBhXkAV4

The UK Status, Change and Projections of the Environment (UK-SCAPE) programme undertakes research and provides national-scale data and models on a range of topics, including biodiversity, air and soil quality, water and food security, pollution, land use and climate change. At BES, we will be promoting the digital outputs from this work and encouraging researchers to explore the new Digital Assets Catalogue to source data and data related products for their own science.

At our stand, Pete Henrys will showcase the UK-SCAPE-developed Digital Science Framework, while Francesca Mancini will focus on biodiversity data and on widening the existing knowledge exchange partnership.

We will be asking visitors to participate in a questionnaire to learn how data delivery from our environmental monitoring can be improved. You can participate virtually by completing the form: https://ceh-online-surveys.onlinesurveys.ac.uk/uk-scape-rapid-survey-bes-dec-2021

This short video features many of the activities that now form the underpinning observations and monitoring component of the UK-SCAPE programme. History of monitoring at UKCEH (https://youtu.be/7MywGLpOBWs)

Other areas of UK-SCAPE science are provided in the animations below:
Greenhouse gas emissions: https://youtu.be/YUwRTLirLpE Pollinator monitoring: https://youtu.be/i7vqbyxMD1M Understanding changing land use: https://youtu.be/sG6-K0NdtOk Ammonia emissions: https://youtu.be/xD5WSZ2Z_fQ Water Resources Portal: https://youtu.be/mLGdM9A7yMU Importance of biological recording: https://youtu.be/rqlTlnZWzOo COSMOS-UK soil moisture animation: https://youtu.be/3roY_cHsn9c

We provide these resources to those unable to join us in person at Stand 9. Contact us via our email or join us on Twitter @UK_CEH and tag #EAB2021 #UKSCAPE

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