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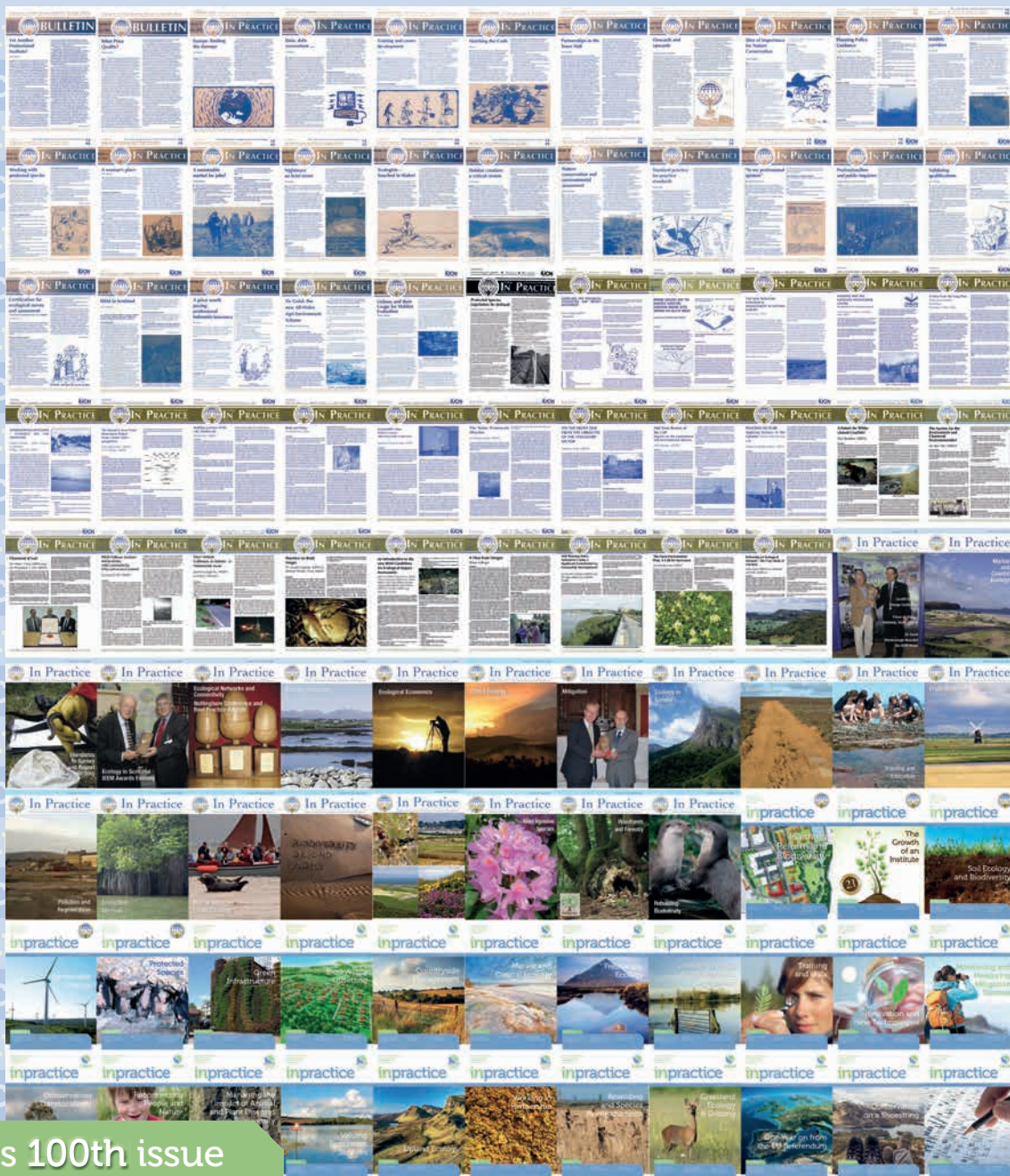
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Big Issues: The Hidden Tragedy of the Earth's Freshwater Ecosystems

Big Ideas: Creating a Mess – The Knepp Rewilding Project

# Introducing the UK Habitat Classification – Updating Our Approach to Habitat Survey, Monitoring and Assessment

**Bill Butcher MCIEEM**  
eCountability Ltd.

**Peter Carey**  
Bodsey Ecology Ltd.

**Bob Edmonds CEnv MCIEEM**  
SLR Consulting Ltd.

**Lisa Norton**  
Centre for Ecology and Hydrology

**Jo Treweek CEcol MCIEEM**  
eCountability Ltd.

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The UK Habitat Classification is a new, free-to-use, unified and comprehensive approach to classifying habitats that is fully compatible with existing classifications. It is designed to provide digital outputs suitable for habitat metrics, impact assessment and better data integration and sharing between organisations.

## Introduction

In March 2015, we argued the case for a new, unified and comprehensive system for classifying UK habitats, reflecting recent developments in technology, policy, data management and information exchange (Edmonds *et al.* 2015). Since then, a steering group of professional ecologists has developed and refined the UK Habitat Classification (UKHab), with a combination of field trials and expert consultations. It has been published online this year with supporting information and guidance (Box 1), which has been designed so that botanical surveyors competent in the use of other UK classification systems can start using it immediately.

A suite of training courses and materials will be available throughout the 2018 field season, to ensure that whatever your current level of expertise, learning how

to use UKHab will be straightforward. We encourage you to download the documents and get out into the field to test them out (<http://ecountability.co.uk/ukhabworkinggroup-ukhab>).

## Rationale for a new classification

Three years ago, we suggested that a new comprehensive habitat classification system was warranted to address systemic problems with current systems and methods. JNCC Phase 1 Habitat Surveys

have been the standard, map-based classification used by ecologists for over 30 years and are still widely used (JNCC 2010). While having the advantage of being simple and intuitive, the classification was developed in the age of paper maps and devised for county-scale surveys. It results in frequent mis-classifications (Cherrill and McClean 1999, Cherrill 2014); does not translate easily into Priority Habitat Types or Habitats Directive Annex 1 types; does not have scope to incorporate assessments of condition, origin or management regime;

### Box 1. The UK Habitat Classification Document Set

#### Workbook (xls) comprising:

The UK Habitat Classification (Professional Edition)  
Complete Primary habitats in hierarchical view  
Complete Secondary code list

The UK Habitat Classification (Basic Edition)  
Selected, regularly found Primary habitats in hierarchical view  
Selected list of most commonly required Secondary codes

List view of all habitats

Cross tabulations with JNCC Phase 1 Audit, National Vegetation Classification (NVC), Farm Environment Plan (FEP) codes and European Nature Information System (EUNIS)

#### Habitat Definitions (pdf)

#### User Manual (pdf) comprising:

The UK Habitat Classification Overview  
Mapping Manual  
The UK Habitat Classification Key  
Suggested Mapping Symbology

and does not perform well in electronic mapping systems because of its architecture. All these issues limit its effectiveness.

Use of different classification systems has made it challenging to share data and interrogate historic datasets. Local Environmental Records Centres (LERCs), government agencies, consultancies and NGOs know that useful information on the UK's habitats remains largely inaccessible because of the prohibitive costs and limitations of translation. A widely adopted, comprehensive classification system would benefit ecologists in all sectors and dramatically improve opportunities to track changes in habitat extent and condition over time. For example:

- Business users of consultancy services would benefit from a streamlined habitat reporting system that lends itself to digital management and output
- LERCs would benefit by being able to integrate habitat data from a wide range of sources
- NGOs would benefit through improved systems to survey and monitor the sites they manage
- Government agencies would benefit through streamlining survey requirements and use of a wider range of local and national habitat data for monitoring and reporting.

A major benefit of widespread adoption of a single system is the potential to combine new field data with existing regional and national habitat datasets managed by LERCs, Centre for Ecology and Hydrology (CEH), National Parks, local authorities and agencies, allowing landscape-level assessment.

### Key features of UKHab

UKHab has been designed to build on existing classifications. It is a fully translatable, hierarchical system that integrates with all major classifications in use in the UK and Europe. The direct and unequivocal interpretation of baseline habitat survey data into Priority Habitat Types and Annex 1 habitat types, fundamental to ecological impact assessment, is a major benefit.

The system includes translation tables that allow legacy datasets to be translated into UKHab and for integration of habitat data collected using other systems. For example, UKHab is designed to integrate with large-scale GIS-based habitat datasets, such as CEH Land Cover Map, giving a significant advantage for scoping large-scale surveys and for sharing data regionally, nationally and internationally.

The architecture and most habitat names used in UKHab should be readily recognisable to all ecologists working in

this field. The primary hierarchy of UKHab consists of five nested 'Levels' (See Box 2 and Figure 1). There is also an extensive list of secondary codes that can be linked to each primary habitat. This combination of primary habitats and secondary codes allows habitat mosaics, habitat management, origins and other environmental and species features to be added directly to each coded primary habitat, removing the need for complex target notes, and increasing consistency and spatial accuracy.

UKHab also includes a mapping protocol and GIS symbology to ensure consistent data collection and presentation of final maps.

### UKHab Habitat Key

A useful feature for new users will be the UKHab Habitat Key for terrestrial habitats, based on a field key extensively field-tested and used across the UK for Countryside Survey (Carey *et al.* 2008). The colour-coded key includes references to National Vegetation Classification (NVC) vegetation types associated with particular habitat types, supporting botanical surveyors who use NVC for survey and monitoring vegetation. UKHab does not aim to replace NVC for detailed vegetation monitoring, but has been designed to complement and allow integration between detailed vegetation sampling and broader habitat surveys. The key also includes direct translation to the

Major ecosystem (level 1)	Ecosystem type (level 2)	Level 2 code	Level 3 habitats; Broad Habitats	Level 3 code	Level 4 Habitats including Priority Habitats ( <b>bold</b> )	Level 4 code	Level 5 Habitats including Annex 1 Habitats ( <b>bold</b> )	Level 5 code
Terrestrial	Woodland and forest	w	Broadleaved mixed and yew woodland	w1	Upland oakwood	w1a	Western acidic oak woodland (H91A0)	w1a5
					Upland mixed ashwoods	w1b	Lime-maple woodlands of rocky slopes (H9180)	w1b5
							Other upland mixed ashwoods	w1b6
					Lowland beech and yew woodland	w1c	Beech forests on acid soils (H9120)	w1c5
							Beech forests on neutral to rich soils (H9130)	w1c6
							Yew-dominated woodland (H91J0)	w1c7
							Natural box scrub (H5110)	w1c8
					Wet woodland	w1d	Alder woodland on floodplains (H91E0)	w1d5
							Bog woodland (H91D0)	w1d6
					Upland birchwoods	w1e		
			Lowland mixed deciduous woodland	w1f	Dry oak-dominated woodland (H9190)	w1f5		
					Oak-hornbeam forests (H9160)	w1f6		
					Other Lowland mixed deciduous woodland	w1f7		
			Other woodland; broadleaved	w1g	Line of trees	w1g6		
					Other broadleaved woodland types	w1g7		
Other woodland; mixed	w1h	Other woodland; mixed; mainly broadleaved	w1h5					
		Other woodland; mixed; mainly conifer	w1h6					
Coniferous woodland	w2	Native pine woodlands	w2a	Caledonian forest (H91C0)	w2a5			
		Other Scot's Pine woodland	w2b					
		Other coniferous woodland	w2c					

Figure 1. The UK Habitat Classification Primary Hierarchy (Professional Edition) for woodland habitats.

Scottish interpretation of EUNIS adopted by Scottish Natural Heritage (Strachan 2017). We believe that use of the key will increase consistency of habitat recording.

### Habitat metrics

UKHab is designed for use in GIS. It does not allow overlapping habitat codes and has a strict protocol for recording fully georeferenced points, lines and areas. This makes it more suitable for the application of habitat metrics than existing systems and ensures that all important landscape features are accounted for.

A robust and repeatable habitat classification for baseline surveys and monitoring is essential for ecological impact assessment and projects seeking to demonstrate 'Biodiversity Net Gain', increasingly considered as a policy objective or benchmark for new development (CIRIA-CIEEM-IEMA 2016). UKHab allows losses and gains to be compared consistently so that outcomes for habitat extent and condition can be tracked at different geographic scales, for example nationally or within a local plan area. Natural England is currently reviewing the use of UKHab as the basis for a revised metric framework. In our view, UKHab provides a robust framework for impact assessment, offset design and auditing biodiversity offsets over time by allowing broad calculations of loss and gain to be supported by more detailed assessment of condition and management incorporating secondary codes. UKHab is also being reviewed in the context of mapping ecosystems as a basis for quantifying ecosystem services (see Box 3).

### Comprehensive and adaptable

Responding to practitioners' requests, UKHab was developed to be adaptable to various survey objectives. The full classification, the UK Habitat Classification Professional Edition, comprises 213 primary habitats and 296 secondary codes. An abridged version, the UK Habitat Classification Basic Edition, with 88 primary habitats and 47 secondary codes, omits habitats that are either small, rare or have a very restricted geographic range, while retaining all Priority Habitat types and major habitat divisions.

## Box 2. Primary Habitats Hierarchy Structure

### UK Habitat Classification – Professional Edition

**Level 1:** the major ecosystem category, currently covering terrestrial, freshwater and coastal ecosystems.

**Level 2:** 9 ecosystem types, based upon the Mapping and Assessment of Ecosystems and their Services (MAES) typology and corresponding with major habitat types within the EUNIS classification.

**Level 3:** 20 broad habitat types, corresponding directly with UK Biodiversity Action Plan Broad Habitats and closely to EUNIS.

**Level 4:** 80 habitats, including 47 UK Biodiversity Action Plan Priority Habitats.

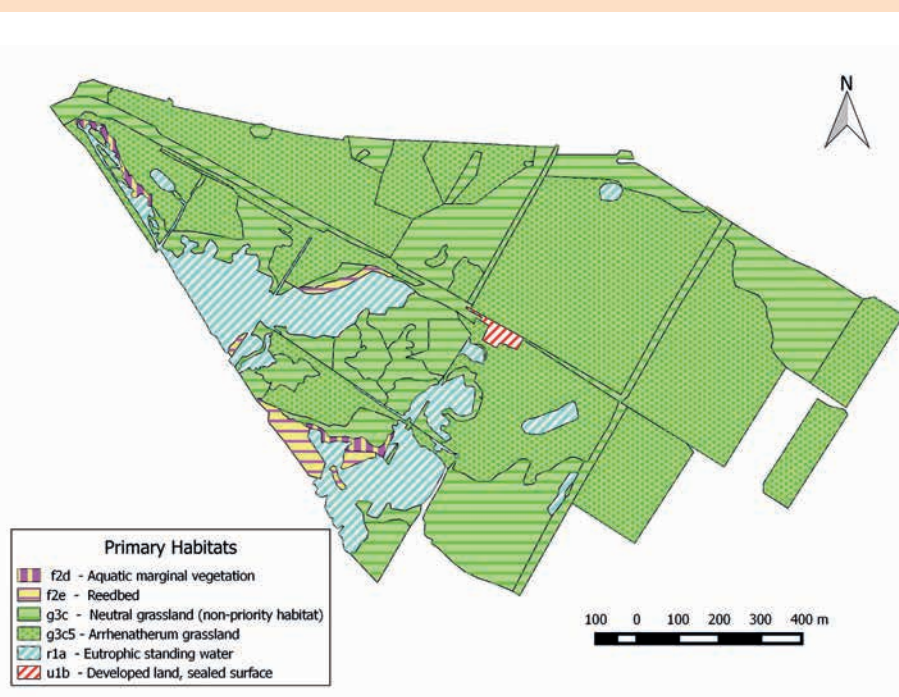
**Level 5:** 104 habitats, including 69 Habitats Directive Annex 1 habitats and divisions of common habitat types, e.g. neutral grassland, missing in previous classifications.

### UK Habitat Classification – Basic Edition

**Levels 1-3:** as described in the Professional Edition.

**Level 4:** 47 habitats, principally UK Biodiversity Action Plan Priority Habitats.

**Level 5:** 12 habitats, including widespread divisions absent from Level 4.



UKHab Map for part of Wicken Fen, Cambridgeshire

**Case Study: Wicken Fen.** In 2017 UKHab (Professional Edition) was used to map sections of Wicken Fen for the National Trust. The land, arable until recently, is now managed as a variety of habitats including wetland. The habitat map can be used for planning future management and as a baseline to show change. Note, only selected Primary habitats are shown here; adjacent areas of the same Primary habitat represent varying secondary codes. This example illustrates some of the advantages of UKHab over previous classifications, e.g. more refined habitat definitions and direct associations of environmental and management secondary codes that cover the whole polygon.

A Green Infrastructure section of secondary codes enables consistent mapping of city greenspaces; this can be used as a stand-alone system or alongside the main habitat classification.

An important aspect of the system's flexibility is the ability to work within different levels of the hierarchy. For example, a large-scale project may use remote-sensed datasets to determine broad habitat types (Level 3), with follow-up walkover surveys recording to UKHab Basic Edition. Where more detailed surveys are required the full Professional Edition can be used.

## Tried and tested

UKHab has been developed collaboratively, relying on input from a wide range of specialists and field trial volunteers. User feedback has led to the development of a mapping symbology; a more detailed breakdown of neutral grasslands and non-priority habitat types; the use of more intuitive coding letters for the major ecosystem types; and highlighted the importance



Cressbrook Dale SSSI, Derbyshire Dales. Grazed dry grasslands and scrub on chalk or limestone with scattered scrub. UKHab Code: g2a5 10 54 89. Inland rock outcrop – s1a.

### Box 3. Comments from users of UKHab

*"CIEEM welcomes innovation in ecological practice, and encourages practitioners to explore new ways of improving accuracy, efficiency and effectiveness of fieldwork. The UK Habitat Classification Scheme potentially represents an exciting development in habitat classification and assessment. The Professional Standards Committee (PSC) congratulates the author team in developing the tool, and is interested to see how it is now applied by practitioners 'in the field'."*

#### CIEEM Professional Standards Committee, April 2018

*"A new habitat mapping protocol that represents mixed communities more clearly and which is easy to read, interpret and analyse clearly and conveniently, is to be welcomed. The new system could also be used for landscape-scale opportunity mapping to identify habitats, linkages and buffering for display, community involvement and funding appeals."*

#### Penny Anderson CEcol FCIEEM (rtd), Director, Penny Anderson Associates

*"We reviewed UKHab for a new ecometric approach to assessing natural capital, which is being developed for Natural England. Our core matrix of scores included 38 rural habitats and 29 urban habitats and green infrastructure features, based mainly on UKHab primary and secondary codes. The translation tables developed by UKHab will be really useful to extend this matrix to other systems such as Phase 1."*

#### Alison Smith, Senior Research Associate, Environmental Change Institute, University of Oxford

*"Local Environmental Records Centres often find it challenging to collate and map green infrastructure data in a standard way. We are confident that widespread adoption of the Green Infrastructure approach will enable robust comparison of greenspace between areas and effective application of greenspace data within ecosystem service assessments."*

#### Mandy Rudd, CEO, Greenspace Information for Greater London CIC.

*"I reviewed UKHab during its development and was particularly interested that it is comprehensive, fully GIS-compatible and enables cross-tabulation between habitat and vegetation classifications already in use. For example, within Natura 2000 sites information about the distribution of Annex 1 habitat is often only available in the form of Phase 1 or NVC surveys, translation can be messy and also involves the loss of data recorded as target notes. I hope ecologists will try out UKHab, safe in the knowledge it is fully compatible with previous systems."*

#### Dr Sophie Lake, Senior Ecologist at Footprint Ecology and co-author of Britain's Habitats: A Guide to the Wildlife Habitats of Britain and Ireland. Sophie is a member of the UKHab Implementation Panel.

*"UKHab provides a useful system that we can use on our properties, mapping what habitat is present now, and then we can re-visit the patches to see how it has developed. We can also target species surveys and monitoring on different selected habitat types."*

#### Stuart Warrington, Regional Wildlife Adviser, National Trust

of translation tables from currently used classifications. In addition, more than 300 detailed comments on habitat definitions and hierarchical relationships between categories have informed revisions for the final published version.

As a result of testing and consultation on the draft classification, a number of organisations from a range of sectors are already looking to adopt UKHab for a wide range of uses (see Box 3).

## Conclusion

The new UK Habitat Classification represents a step-change in habitat recording in the UK, for the first time allowing full integration between Broad and Priority Habitat Types and Annex 1 Habitats and, importantly, allowing translation to and between all commonly used existing systems. The classification is flexible enough for use in a wide range of survey types from walkover surveys for small scale development to regional- and national-scale habitat mapping in both analogue and digital systems. Widespread

adoption will enable all of us, as ecologists, to provide robust and comparable measures of how our countryside is changing over time and how it differs across space at a range of scales. We encourage ecologists working in all sectors to download the document set, participate in training, and try out the new system for themselves. We welcome constructive feedback from ecologists and hope that over time a community of practice will develop to support the continued development of UKHab.

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## About the Authors



Bill Butcher, a Director at eCountability Ltd, specialises in habitat information management in the UK and overseas, including the application of habitat and ecosystem service metrics in impact assessments. Bill is a former Trustee of the National Biodiversity Network and has led many site, county and regional habitat surveys and inventories for the Wildlife Trusts and Local Environmental Records Centres.

**Contact Bill at:**  
[bill.butcher@ecountability.co.uk](mailto:bill.butcher@ecountability.co.uk)



Pete Carey is an affiliated lecturer in the Department of Plant Sciences, University of Cambridge, and is the Director at Bodsey Ecology Limited. He managed the Countryside Survey 2007 field campaign (Carey *et al.* 2008) and has worked across Europe on evaluation of agri-environment schemes. He has recently been working with Natural England to produce habitat mapping and condition protocols.

**Contact Pete at:**  
[bodsey.ecology@btinternet.com](mailto:bodsey.ecology@btinternet.com)



Lisa Norton is a senior research scientist at CEH Lancaster, where she leads the Land Use Group and manages the Countryside Survey, a national survey incorporating habitats, landscape features, vegetation, soils and water.

**Contact Lisa at:**  
[Lrn@ceh.ac.uk](mailto:Lrn@ceh.ac.uk)



Bob Edmonds, a Technical Director at SLR Consulting Ltd, specialises in ecological impact assessment, protected species mitigation and Biodiversity Net Gain. Bob is a member of CIEEM's Professional Standards Committee and contributed to CIEEM's EclA and PEA Guidelines and the CIRIA-CIEEM-IEMA Biodiversity Net Gain Good Practice Principles for Development.

**Contact Bob at:**  
[bedmonds@slrconsulting.com](mailto:bedmonds@slrconsulting.com)



Dr Jo Treweek, a Director at eCountability Ltd, specialises in assessment of impacts on biodiversity and ecosystem services. She works in the UK and overseas on projects involving compliance with International Performance Standards and habitat restoration for purposes of biodiversity offsetting. Jo is co-chair of the Biodiversity and Ecology Section of the International Association for Impact Assessment.

**Contact Jo at:**  
[jo.treweek@ecountability.co.uk](mailto:jo.treweek@ecountability.co.uk)