Data Exchange Standard for Peat Surveys

England Peat Map Project

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Contents

Purpose

Peat data are collected by many organisations in England and around the world. Data are collected for a variety of reasons, including monitoring and restoration efforts, but also for development or archaeological work. Currently, there is no agreed data standard for peat survey data. Peat surveys are conducted with various methodologies, with data recorded in different formats. This makes it difficult to integrate different datasets for use in large scale analyses.

The purpose of this document is to provide a starting point, from which a standardised format for peat data can be developed. We would like to encourage existing efforts in the peatland community to adopt a common standard in the future. This would facilitate easier data sharing and collaboration in the future. The current version of this document is produced by the England Peat Map project, which supports the England Peat Action Plan [1]. The England Peat Map project is part of the Defra-funded Natural Capital Ecosystem Assessment (NCEA) programme launched to transform decision-making by delivering high quality evidence to assess the extent and condition of biodiversity, ecosystems, and natural capital assets. It is anticipated that a future version will be maintained within the wider peatland community.

Introduction to the Standard

In developing this standard, we have referred to many existing peat datasets and drawn on relevant existing standards, primarily Darwin Core [5] for biodiversity data and the NBN Atlas [3] for metadata.

This standard comprises a series of defined terms, either required, desirable, or optional. Terms that are ‘required’ are mandatory to make a record useable. Terms that are ‘desirable’ are not necessary but would improve the quality of a record. Terms that are ‘optional’ are not always appropriate, but some surveys may desire them.

We found many existing peat depth survey datasets which did not record some key information, such as whether the full depth of peat was recorded. While such data can still be used (e.g. to determine a minimum peat thickness) some of the value of the surveyor being able to capture such data in the field is lost. In the future, we would hope that data are shared with these important attributes included. We accept, however, that it will not be possible for all existing survey data to be fully compliant with this standard.

Scope

Whilst the focus has been for the standard to support data gathering for the England Peat Map project, including support for the Ordnance Survey National Grid, it is applicable globally.

The current version of this document covers peat depth data, predominantly those gathered using probes. Future versions are intended to incorporate data from other peat survey types, e.g. surface features, vegetation mapping, and peat condition.

In addition to measuring the depth of surface peat, this standard has scope for a single, optional, measurement of buried peat, but does not explicitly support any subsequent layers of buried peat. In part this is because this is data that is difficult to determine using peat probes, and typically requires soil core samples to be taken. However, an option for how the standard could be extended is described.

It should be noted that particular survey methodologies may well require additional information to be collected, or mandate attributes that are optional according to the standard. The use of this standard does not preclude any particular survey methodology or guidelines. Similarly, how peat or peaty soil is determined, e.g. percentage of organic soil, would form part of the survey methodology and does not impact on the standard: we make no assumption here about how peat is defined. Depending on the particular survey aims and methodology, it may be appropriate to refer to the various soil standards, e.g. see [7].

There is certainly merit in standardising survey methodologies as well as data exchange. This is not within scope of this document, but it is intended that future publication of the England Peat Map project survey guidance will be a step towards this.

Document History

Revision History

Date	Author	Version	Description
5 June 2023	Mike Prince	1.0	First issued version

Data Exchange Format

This standard requires two files to fully describe peat survey data:

1. The individual Peat Data Records forming the dataset
2. A Metadata file describing the dataset

Peat Data

The table below defines Attributes relevant for peat survey data. For terms that are also used in other recording standards, e.g. the Darwin Core terms [1], the Term Definition column provides hyperlinks to where the standard meaning of the term is defined. The Description column recommends how the attribute is to be used in a Peat Survey context, and the Example column shows possible example values for peat survey data. All Required attributes are indicated within the first column.

Data are not restricted to the attributes listed here: others outside of this standard may be defined as required to suit a particular survey's needs[1].

Attribute	Term Definition	Description	Example
recordDate [Required]	eventDate	Date (and, optionally, time) that peat depth measurement was taken, typically in format YYYY-MM-DD.	2021-10-04
surveyor [Required]	recordedBy	Name or names of persons, groups, or organisations who recorded the peat depth measurement. Note that personal data must be managed in accordance	Pete Marsh

[1] For example, this specification includes the optional attributes buriedPeatStartDepth and buriedPeatEndDepth. A particular survey could decide to extend this and introduce buriedPeatStartDepth1, buriedPeatEndDepth1, buriedPeatStartDepth2, buriedPeatEndDepth2 etc., if it required to record multiple buried peat layers. Similarly, the Nature for Climate Peatland Grant Scheme [9] uses a Peat Depth template which includes additional attributes such as Site ID and Photo ID, which could easily be supported by adopting and extending this standard.

Attribute	Term Definition	Description	Example
		with the principles of the Data Protection Act 2018 [6] and/or any subsequent legal provisions.	
institution [Required]	institutionCode	The name (or acronym) in use by the institution having custody of the particular record. Full names are recommended to avoid potential ambiguities.	Defra
location [Desirable]	location	Spatial region or named place.	New Forest National Park
country [Desirable]	country	Country or major administrative unit in which the Location occurs.	England
latitude [Required if gridReference, and easting and northing, not provided]	decimalLatitude	The geographic latitude (in decimal degrees, using the spatial reference system given in geodeticDatum) of the geographic centre from where the measurement was taken.	50.955177
longitude [Required if gridReference, and easting and northing, not provided]	decimalLongitude	The geographic longitude (in decimal degrees, using the spatial reference system given in geodeticDatum of the geographic centre from where the measurement was taken.	-1.7509012
coordinateUncertainty [Desirable if latitude and longitude provided]	coordinateUncertaintyInMeters	The horizontal distance, i.e. radius, (in metres) from the given latitude and longitude describing the smallest circle containing the whole of the	10

Attribute	Term Definition	Description	Example
		record location. This can allow for GPS inaccuracy. Leave the value empty if the uncertainty is unknown and cannot be estimated, or is not applicable (because there are no coordinates).	
geodeticDatum [Required if latitude and longitude provided]	geodeticDatum	The ellipsoid, geodetic datum, or spatial reference system (SRS) upon which the geographic coordinates given in latitude and longitude are based.	WGS: 1984
gridReference [Required if latitude and longitude, and easting and northing, not provided]		Location of the record using the Ordnance Survey National Grid reference system[2]. Recommended precision is for at least eight-figure grid references, i.e. 10m x 10m.	SU 33140 07406
easting [Required if latitude and longitude, and gridReference, not provided]	verbatimLatitude	Easting of the record, in metres, using OSGB36 National Grid.	433152
northing [Required if latitude and longitude, and	verbatimLongitude	Northing of the record, in metres, using OSGB36 National Grid.	107413

[2] See https://getoutside.ordnancesurvey.co.uk/guides/beginners-guide-to-grid-references/ for an introduction to Ordnance Survey grid references.

Attribute	Term Definition	Description	Example
gridReference, not provided]			
locationRemarks [Desirable]	locationRemarks	Comments or notes about the specific location of this measurement. Particular surveys may consider use of the IUCN Peatland Code [8] Condition Category for this, e.g. “Near Natural”, “Modified”	In gully
surfacePeatDepth [Required if peatPresence not provided]	measurementValue	Maximum depth of surface peat (organic soil depth), measured from the surface, specified in centimetres. Depth may be zero if there is no surface peat.	143
peatDepthResolution [Desirable]	measurementAccuracy	The description of the potential error, if any, associated with the surfacePeatDepth measurement, e.g. was peat depth measured to the nearest 1cm, or 10cm, or was the bottom difficult to ascertain with certainty? peatDepthRemarks should be used to provide further details, including any difference with resolution for buried peat measurements.	Nearest 1cm
peatPresence [Required if surfacePeatDepth not provided]		Alternative to surfacePeatDepth, providing a simple indication of whether peat was present at the location. Values:	Yes

Attribute	Term Definition	Description	Example
		• Yes • No The peatDepthRemarks attribute may be used for further detail, e.g. “Visual check”.	
buriedPeatStartDepth [Optional]	measurementValue	Start point of buried peat layer from the surface, i.e. depth first detected, specified in centimetres.	220
buriedPeatEndDepth [Optional]	measurementValue	End point of buried peat layer from the surface, i.e. maximum depth, specified in centimetres.	315
surfaceElevation **[Optional]**	measurementValue	Elevation of the ground surface, specified in centimetres. Useful in areas such as degrading or eroding peatlands, where elevation could change over time.	1050
probeType [Desirable]		Type of peat probe or other sampling method. Values: • peat probe • avalanche probe • cable rod • drainage rod • threaded rod • peat borer[3]	avalanche probe

[3] Russian borer/auger

Attribute	Term Definition	Description	Example
		• soil corer • open end corer • stick • other The “other” option may be used for devices used that are not actually peat probes, e.g. surface level rods, supported by peatDepthRemarks for additional details.	
probeReachedBottom [Required]		Was the base of the peat layer(s) reached, e.g. was probe long enough to measure the full depth of peat? As opposed to suspecting that peat continued to lower depths that could not be measured. “No” means that the full depth of peat was not measured, and hence the peatDepth recorded is a minimum value only. “No” should also be used if the surveyor was unsure. Values: • Yes • No	Yes
peatDepthRemarks [Desirable]	measurementRemarks	Comments or notes on this peat depth measurement. Can include an assessment of confidence, e.g. if it is difficult to determine the exact bottom of the organic layer, density of substrate preventing recording a deeper depth using peat probes etc.	Average of 3 separate field measurements

Location Specification

This standard allows the specification of geographic location in any of three possible ways:

- Latitude and Longitude
- Ordnance Survey National Grid references
- Ordnance Survey National Grid eastings and northings

These are listed in order of priority so, if more than one option is supplied for the same record and there are any discrepancies, only the highest priority one needs to be considered.

Eastings and northings are assumed to be for the British National Grid OSGB36 (EPSG:2770). A future version of this document may provide extra flexibility, introducing the Darwin Core terms verbatimCoordinateSystem and verbatimSRS, to allow eastings and northings to be used globally.

Peat Depth Measurements

Depth attributes in this standard are measured from the surface. This is illustrated below in Figure 1.

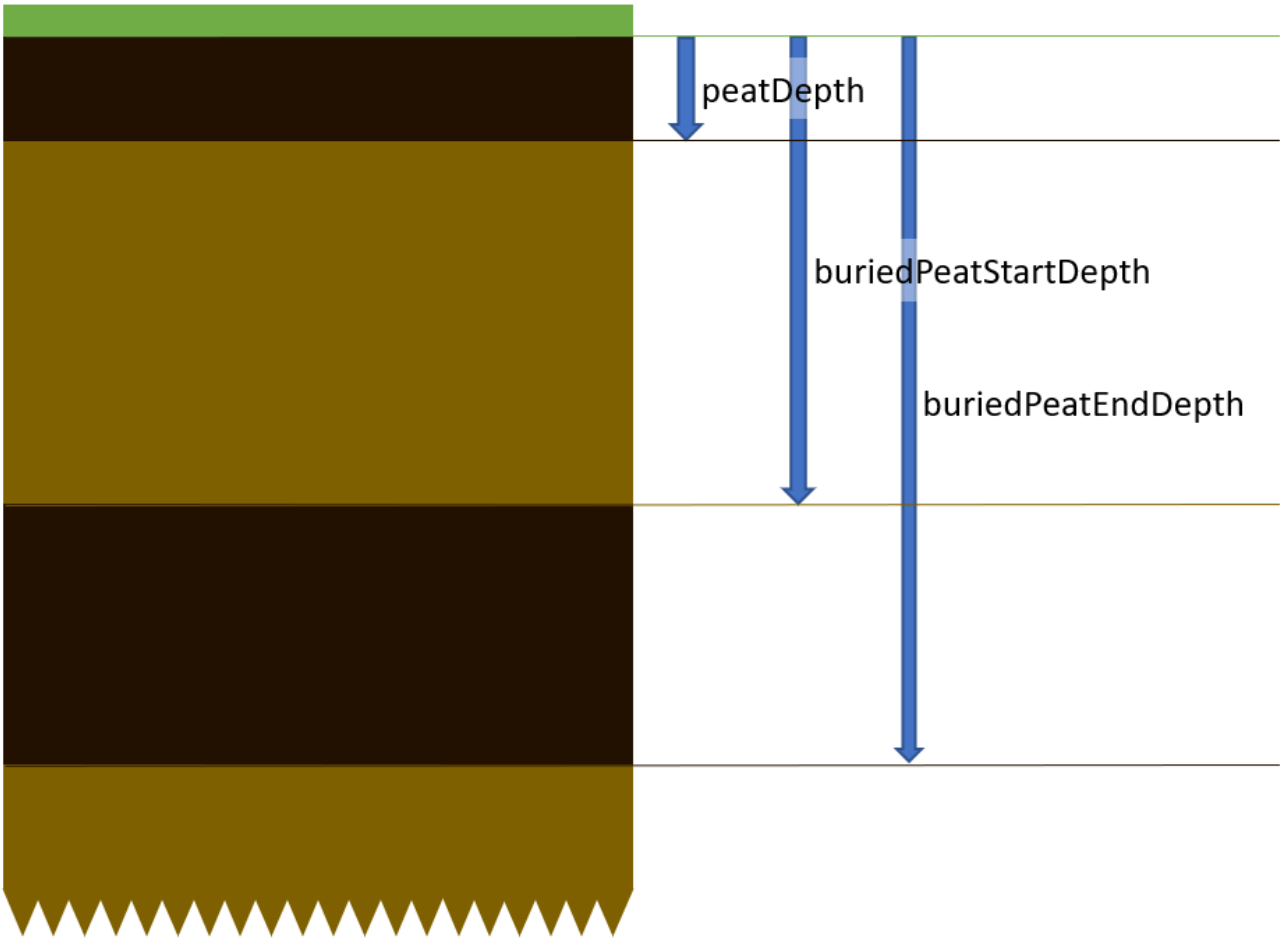

Figure 1 Measurement of peat depth attributes

Data File Format

Datasets shall be provided in one of two ways, either comma-separated values (CSV) format, or a GIS vector features dataset.

CSV

The first record is a header record containing a list of field names, including at a minimum the Required attributes from the attribute table above. Desirable attributes, if not used for any individual record within the dataset, may be omitted.

The order of attributes is recommended to follow the ordering in the attribute table for consistency, but this is not mandatory.

Files shall conform to the RFC 4180 standard [4], which is based on the most common CSV implementations and covers line feeds, quotes etc.

It should be noted that Microsoft Excel is not compliant with RFC 4180, and CSV files can be interpreted differently by Excel depending on the user's locale, so it is not recommended to exchange Excel files instead of CSV. If Excel is to be used, any CSV

files produced from it should be checked to ensure that they are compliant with this standard.

GIS Vector Features Dataset

Vector features datasets in GIS are comprised of vectors, e.g. polygons, lines, points, with an associated attribute table for each. Common forms include shapefiles, geopackages and layer files. Attributes defined shall include, at a minimum, the Required attributes from the attribute table above. Note that shapefiles typically limit text attributes to 255 characters.

Metadata

The table below defines metadata relevant to support the peat survey data. This has been primarily adapted, with permission, from the metadata file used by the NBN Atlas [3]. All Required attributes[4] are indicated within the first column.

Metadata are not restricted to the attributes listed here: others outside of this standard may be defined as required to suit a particular survey's needs.

Metadata Term	Description	Example
title [Required]	The title by which the dataset is commonly known. Best practice is to include the data subject, date range and geographic extent.	Peat Depths for New Forest September 2020
organizationName [Required]	Name of organisation or group	Defra
abstract [Required]	General description of the dataset. This should summarise the overall project for which this	Peat depths from survey carried out on

[4] For consistency with Darwin Core and other referenced standards, attribute names specified here follow American spellings, e.g. use of license instead of licence, organization instead of organisation. However, this document otherwise follows British spelling in text.

Metadata Term	Description	Example
	data was collected, and include a mention of the general habitat. See also additionalInfo, purpose and methods.	New Forest by Defra in September 2020.
additionalInfo [Desirable]	Details on where additional information about the data can be found. For example, this could refer to a supplementary report by your organisation.	Survey data included in Assessing Carbon Stocks within New Forest Peat www.example.com/newforest-peat.pdf
license [Required]	The licence that should be applied to all records in the dataset. Values: • CC0 • CC-BY • CC-BY-NC • OGL • NCGL • Other Should there be particular sensitivities in the dataset that prevent its publication using one of the named licenses, then an “Other” licence would be appropriate with the specific usage restrictions detailed there.	CC-BY
rights [Desirable]	Additional information about copyright or usage rights, in particular for “Other” licences.	
bibliographicCitation [Desirable]	The text that should be used when the dataset is cited in	

Metadata Term	Description	Example
	publications and reports, to acknowledge its use.	
geographicDescription [Desirable]	Description of the geographic extent of the dataset. For survey-based data this may be a larger geographic area than the occurrence of records within the dataset, e.g. designated site name, county.	New Forest National Park
westBoundingCoordinate [Desirable]	Westernmost coordinate of data coverage	-1.80
eastBoundingCoordinate [Desirable]	Easternmost coordinate of data coverage	-1.30
northBoundingCoordinate [Desirable]	Northernmost bounding coordinate of data coverage	51.30
southBoundingCoordinate [Desirable]	Southernmost coordinate of data coverage	50.70
temporalCoverageStartDate [Desirable]	Earliest record date	2020-09-19
temporalCoverageEndDate [Desirable]	Latest record date	2020-09-21
purpose [Desirable]	The purpose for which the records were originally collected and also, where different, the reason for producing the dataset.	Carbon monitoring across the New Forest OR

Metadata Term	Description	Example
		Tree planting investigative survey
methods [Desirable]	A concise description of the methods and techniques used in the creation of the dataset, including those used in data capture plus verification and validation. Highlight any areas of uncertainty with regard to any aspect of data capture and collation.	Covered in detail in accompanying report.
qualityControl [Desirable]	An assessment of the quality of data capture and/or the collated dataset as a whole. Ascribe your general level of confidence in the data source, processing, validation, and record collation.	
contactGivenName [Desirable]	Dataset contact's first name	Pete
contactSurname [Desirable]	Dataset contact's surname	Marsh
contactElectronicMailAddress [Required]	Dataset contact's email	pete.marsh@example.com
contactPhone [Desirable]	Dataset contact's phone number	0800 1234567

Metadata File Format

Metadata shall be provided in a comma-separated values (CSV) format.

The first record is a header record containing a list of field names, including at a minimum the Required metadata terms from the table above. Desirable terms, if not used, may be omitted.

The order of metadata terms is recommended to follow the ordering in the metadata table for consistency, but this is not mandatory.

Files shall conform to the RFC 4180 standard [4].

References

[1] England Peat Action Plan. May 2021. https://www.gov.uk/government/publications/england-peat-action-plan

[2] Darwin Core Maintenance Group. 2021. List of Darwin Core terms. Biodiversity Information Standards (TDWG). http://rs.tdwg.org/dwc/doc/list/

[3] National Biodiversity Atlas (NBN) Atlas (https://ror.org/00mcxye41) at http://www.nbnatlas.org. Accessed 30 September 2022.

[4] Shafranovich, Y., "Common Format and MIME Type for Comma-Separated Values (CSV) Files", RFC 4180, DOI 10.17487/RFC4180, October 2005, https://datatracker.ietf.org/doc/html/rfc4180.

[5] Wieczorek J, Bloom D, Guralnick R, Blum S, Döring M, et al. (2012) Darwin Core: An Evolving Community-Developed Biodiversity Data Standard. PLoS ONE 7(1): e29715. https://doi.org/10.1371/journal.pone.0029715

[6] Data Protection Act, 2018. Data Protection Act 2018. GOV.UK. https://www.gov.uk/government/collections/data-protection-act-2018

[7] Batjes, N., 'International' soil standards, ISRIC — World Soil Information, https://www.isric.org/international-soil-standards

[8] Peatland Code, v1.2, April 2022, IUCN UK National Committee.

[9] Nature for Climate Peatland Grant Scheme: Restoration Grant, Guide for Applicants 2023. February 2023, v3.1 Draft.

About Natural England

Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

Further Information

For information on this publication, please contact the England Peat Map project by emailing peatmap@naturalengland.org.uk.

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