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Title	**MEDIN data guideline for sediment sampling by grab or core for benthos**
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Summary	This guideline defines the format of data and information produced from the collection of benthic samples using a grab or core. If used correctly the data will be readily used and reused. An xls template is provided if required.
Keywords	Sediment, Benthos, Grab, Core

Change history

Version	Date	Change
1.0	23/03/09	First draft of document
1.1	2/04/09	Incorporated comments and excel template
1.2	22/03/09	Further refinement following comments
1.3	20/05/09	Further refinement following comments by MEDIN standards Group
1.4	19/0709	Refinement following comments from Marine Monitoring Group, NMBAQC and other users.

1.1. Background

The Marine Environmental Data and Information Network (MEDIN) is working towards creating a framework of consistent standards covering the major types of data collection undertaken in the marine environment around the UK. The principle benefits of this suite of standards are:

- Allows contracting organisation to easily specify a format that data should be returned in that can be readily used and includes all relevant attributes
- Provides a consistent format for contractors to work to (rather than a different format for each contract)
- Data can be readily exported to Data Archiving Centres and other users
- Instills good practice amongst users

Each standard defines the data and information that must be stored with a particular data type to ensure it can be readily used and reused. As this type of information is specific for different data types, guidelines are developed for each type. This document describes one such format. Other standards can be accessed through www.oceannet.org.

1.2. Scope

This guideline covers the collection of benthic samples using a grab or core. It covers both the raw data from such sampling (actual counts of organisms), methodologies used (eg. sampling devices used) and derived summary information.

1.3. Using this data guideline

This guideline is split into sections that refers to information that can be collated at different levels. Information that is likely to be the same for all samples (e.g. ship used, datums used) is collated in the ‘Survey Information’ table. Information that is common to each station and sample is collected in the ‘Station Information’ and ‘Sample Information’ table respectively and the raw species data is collected in the ‘Sample Data’ table. The survey information stated in this guideline is common to all MEDIN guidelines and may be used in part to derive a MEDIN discovery metadata record. Where the survey is part of a ship cruise then the cruise report may hold the required information.

Following feedback from users the preferred format for holding the raw species data is in the format where each record is presented as a row. This is how it is anticipated that data is exchanged as it allows the application of other information such as stage of development, biomass etc to be recorded for each species. However it is recognized that often results are produced in a matrix format and this may be used for specific applications.

The tables below outline the data fields, a description and where available a term list and/or format given at the end of each field which should be used to store the data. Each field is either mandatory, optional or conditional as indicated by M, O or C respectively. In the absence of an existing spreadsheet or database to hold the below information, it is recommended that the template available to download from the MEDIN website is used. Instructions are provided in the template. If the data is to be submitted to a Data Archiving Centre it should be submitted as an MS Excel spreadsheet.

1.4. Further information on the SeaDataNet, ICES and EPSG term lists

The available catalogues of term lists used for this MEDIN data guideline are provided primarily by SeaDataNet, the International Council for the Sea (ICES) and EPSG. If a term is not available in a recommended list then please contact MEDIN to arrange for the term to be added.

The SeaDataNet list may be viewed at http://seadatanet.maris2.nl/v_bodc_vocab/welcome.aspx . By clicking on the list any term may be searched for by using the drop-down menus or all terms viewed by clicking search. The terms may be viewed in groups of 15 or may be downloaded into an excel file.

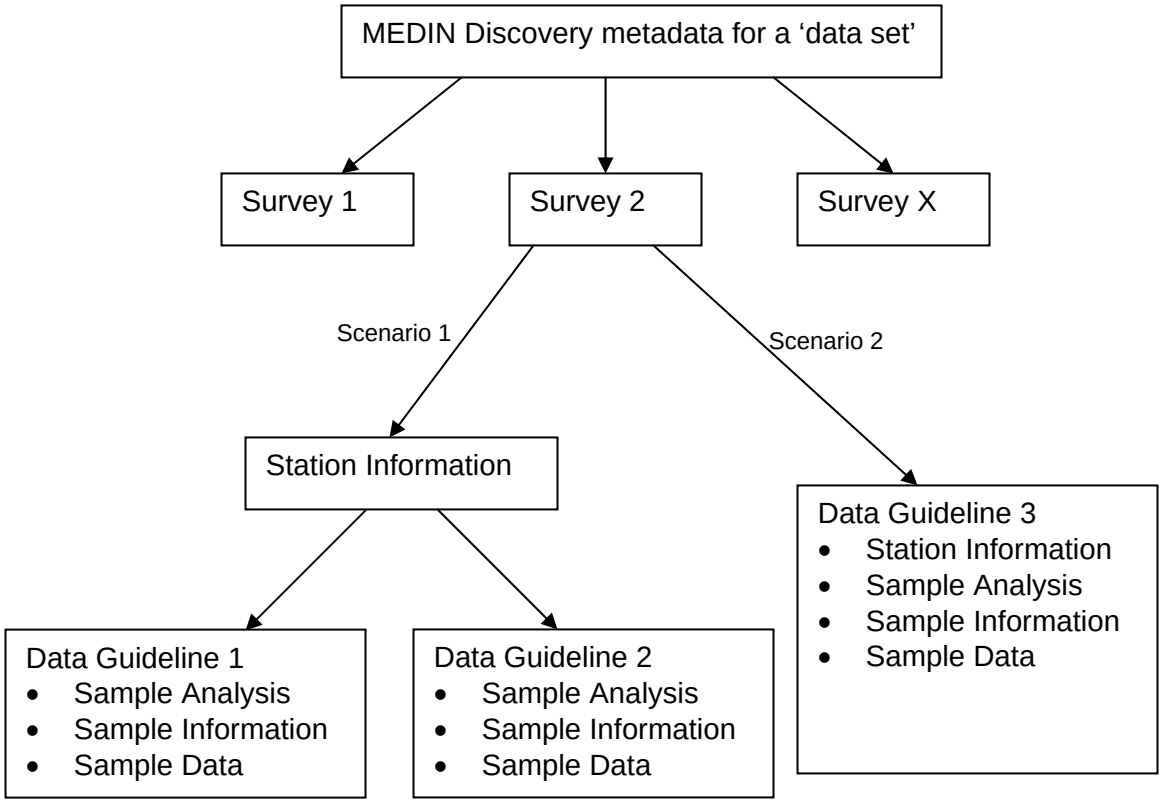
The ICES term lists are available at http://www.ices.dk/datacentre/reco/ Select which list you require from the 'Reference Code List' drop-down box. The results are shown for the selected list and may be downloaded into MS Excel by selecting the inverted green arrow.

There are a number of ways of describing a spatial dataset. Common horizontal coordinate reference systems include WGS84 and British National Grid. Common vertical coordinate reference systems include Highest Astronomical Tide and Ordnance Datum Newlyn (ODN). It is important that which coordinate reference system used for a data set is recorded so conversions can be carried out between reference systems. The EPSG database of coordinate reference systems (http://www.epsg.org/Geodetic.html) provides a dictionary of reference systems. In brief, to find a code click on the OGP Online Registry and if you know the title (eg WGS84) then type this in the 'Name' field and click search. The name, code and further information is displayed. If you are looking for a specific type of reference system such as 'vertical' then click in the 'Type' box, hover over coordinate reference system and click on vertical and then click the search button and all recorded vertical reference systems are shown. If you want to search for a reference system in a particular part of the world (e.g. Northern Ireland Grid) the you may do so by submitting a term to the 'Area' box or fill out the lat and longs then click search. The website also provides a database of the reference systems and web services to access the information.

1.5. Relationship between MEDIN data guidelines and MEDIN discovery metadata

The MEDIN discovery metadata format is aimed at allowing the non-informed user to discover data sets and it is likely that one 'discovery' data set record will contain a large range of data types that are in turn covered by a range of data guidelines. To enable individuals to reuse data of a specific nature (e.g. benthic invertebrate data) then related information must be collected (e.g. data owner, reference systems used etc). Some of the information which is collected at the Survey Level in a data guideline is also required to create a discovery metadata record. Who creates the MEDIN discovery record for a dataset is case specific and dependant on the organisation, and the relationship it has with a Data Archive Centre. However it is intended that the information collected at the 'Survey Information' level is reused for creating a MEDIN discovery metadata record.

A schematic of the relationship between different levels of data in a MEDIN guideline and the MEDIN discovery metadata format. Note that a 'dataset' may consist of 1 or more surveys and that if range of measurements are made at one station (scenario 1) then the station information will also be common across data guidelines.



2.1. Survey Information. This information is likely to be the same for all samples. Note that in the event that these are not common to all samples then they should be specified for each sample. **M, O, C** indicate which fields are mandatory, optional or conditional. These fields are common throughout many other MEDIN data guidelines.

Heading	M, O, C	Description	Recommended Term List or Format
Survey Name	M	Title of the Survey	Free text; (e.g. Menai Straight Benthic Survey 2004)
Survey Description	M	Brief description of the purpose of the survey and other types of measurements that were made for the survey.	Free Text
Responsible Organisation	M	Organisation who has funded the work	Term List; European Directory of Marine Organisations (e.g. 28: Centre for Environment, Fisheries and Aquaculture Science, Lowestoft Laboratory)
Survey Start Date	M	The date and time that the survey started.	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss (e.g. 2009-01-24 12:33:00)
Survey End Date	M	The date and time that the survey ended.	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss (e.g. 2009-02-16 16:33:00)
Spatial coordinate reference system	M	Describes the system of spatial referencing. I.e. the datum used to provide details of latitude and longitude.	Term List; http://www.epsg.org/Geodetic.html (e.g. WGS84 is EPSG::7030)
Horizontal Positional accuracy	M	How accurate the spatial positions are likely to be	Number; units = meters (e.g. 15)
Depth coordinate reference system	C	Give the reference to which the depth has been calculated e.g. Highest astronomical tide. Mandatory if seabed depths are given for each sample.	Term List http://www.epsg.org/Geodetic.html (e.g. ODN is EPSG::5701)
Vertical positional accuracy	C	How accurate the vertical resolution is. Must be provided if depths are given.	Number; units = meters (e.g. 0.5)

Platform Type	O	The platform type (e.g. Research Vessel) from which the sampling device was deployed.	Term list SeadataNet Platform Classes (L061) (e.g. 31)
Ship name	O		Term list SHIPC at http://www.ices.dk/datacentre/reco/ (e.g. 74LG Lough Foyle)

2.2. Station Information. This table holds information on the location and time of sampling at each station. In some instances a number of samples are taken at each station and therefore the information in this table will be the same across a number of samples.

Heading	**M, O, C**	**Description**	**Recommended Term List or Format**
Local station identifier	M	A unique identifier for the station under consideration	e.g. Stanton Bank site 4 e.g. PS74926
Latitude of sample given in original recorded format	M	The latitude of the sample given in whichever format was used to record at the time of sampling. Units are positive north.	e.g. 50°47'24''
Longitude of sample given in original recorded format	M	The longitude of the sample given in whichever format was used to record at the time of sampling. Units are positive east.	e.g. -4°21'53''
Latitude of sample (decimal degrees)	M	The latitude of the sample given in decimal degrees. Units are positive north.	Decimal degrees; minimum of two and a maximum of five decimal places. e.g. 54.5837
Longitude of	M	The longitude of the sample given in decimal	Decimal degrees; minimum of two and

sample (decimal degrees)		degrees. Units are positive east.	a maximum of five decimal places. e.g. -3.476
Date and time	M	The date and time of sample collection.	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss (e.g. 2009-01-24 13:33:00)

2.3. Sample Analysis and Techniques

If the information in this category is the same for all samples within a data set the Survey Name must be completed to allow links to the sample information. If the sample analysis and techniques are different for each sample then the fields in this table should be appended to the sample information and be completed for each sample. Information in this table may also be used to complete fields in the discovery metadata.

Heading	**M, O, C**	**Description**	**Recommended Term List or Format**
Survey Name	M	Title of the Survey	Free text; (e.g. Menai Straight Benthic Survey 2004)
Sieve mesh size	M	The mesh size of the sieve used to extract the benthos from the sediment	Integer number; units = um. (e.g. 500)
Storage medium	O	The storage medium used	Text; (e.g. 50% Formalin)
Methodology	M	Any written methodology used should be referenced and linked. If the methodology is not referenced then provide a description here.	Text; (e.g. Methodology follows the Green Book http://www.cefas.co.uk/publications/scientific-series/green-book.aspx)
Analytical Laboratory or Organisation	M	The laboratory/organisation that analysed the samples	Reference Code list RLABO at http://www.ices.dk/datacentre/reco/ (e.g. UNIC Unicomarine Ltd, Letchworth Laboratory)
Analytical	O	Names or the personnel who were involved in	Text, personnel initials given and separated

personnel		analysing the samples	by semi-colon if more than one personnel used; (e.g. J. Bloggs analysed all samples).
Sampling analysis notes	O	Any further notes on sample analysis that may be of relevance	Text; (e.g. 10% of samples were checked by B. Begger for QC purposes)
Quality Control Scheme	M	Description of any quality control scheme that the laboratory participated in during the analysis.	Text; (e.g. National Marine Biological Analytical Quality Control Scheme)

2.4. Sample Information. These fields are specific to each sample and hold information that is essential to be recorded so that it may be reused in the future. The Station Identifier creates a link between the samples and the station location details.

Heading	**M, O, C**	**Description**	**Recommended Term List or Format**
Local station identifier	M	A unique identifier for the station the sample was taken from	e.g. Stanton Bank site 4 e.g. PS74926
Sample Identifier	M	A unique identifier for the sample under consideration	Text; (e.g. E5; PHJ7936)
Pooled samples	C	If more than one grab/core has been pooled to create a sample then indicate the number of grabs/cores used. Mandatory if samples are pooled	Integer number. (e.g. 1, 2, 3,)
Sampling Device	M	The type of sampling device used	Term Code list SMTYP at http://www.ices.dk/datacentre/reco/ (e.g. DA Day Grab)
Sampling device surface area	O	The surface area of the sampling device	Integer number; units = cm^2. (e.g. 100)
Upper depth of sediment	O	The upper depth of the sediment which has been sampled. In all cases this will be 0, unless sections	Integer number; units = cm. (e.g. 0)

sample		have been taken from a sediment core.	
Lower depth of sediment sample	O	The depth to which the device sampled.	Integer number; units = cm. (e.g. 10)
Depth of seabed	O		Integer number; units = meters. (e.g. 24)
Sampling personnel	O	Names or the personnel who were involved in collecting and field processing the samples	Text, personnel initials given and separated by semi-colon if more than one personnel used; (e.g. J. Bloggs; B. Begger collected and field processed samples)
Sample collection notes	O	Any further notes on the sample collection that may be of relevance	Text; (e.g. Due to rough weather the grab was not stable when it reached the sea floor and the sample was visibly disturbed upon recovery; anoxic layer evident a 4cm depth)
Biotope	C	If the biotope has been inferred from the contents of the grab and other information then indicate here	Reference Code list EUNIS habitat classification. See http://eunis.eea.europa.eu/habitats.jsp for further details
Photographs and Videos	C	Describe if images were taken at any stage of the collection or processing, the purpose they were collected for, where they are held, what their IDs are and what format.	Text; (e.g. Images taken of grab before sieving to give indication of sediment type. Images submitted to MEDIN using data guideline on digital images. Images reference numbers are: Fladden_02mar08_01 to Fladden_02mar08_68)
Associated Information	C	If subsamples were taken at the same station and used for other analysis (e.g. particle size analysis)	Text; (e.g. Particle Size analysis was carried out as a separate sample at each station)

2.5 Sample Data. When providing the sample data it must be clearly linked to the station and sample information for a given sample, date/time and replicate. The preferred format for holding the raw species data is in where each record is presented as a row. However it is recognized that often results are produced in a matrix format and this may be used for specific applications.

Heading	M, O, C	Description	Recommended Term List or Format
Sample Identifier	M	A unique identifier for the sample under consideration	Text; (e.g. E5; PHJ7936)
Taxon	M	Give species name where possible or higher taxonomic group if not	Reference code list http://www.marinespecies.org/ (e.g. Mytilus edulis)
Abundance (Counts and Presence)	M	Abundance of each species	If counts of individual taxon then give number (e.g. 34). If presence/absence then give P/A.
Abundance (SACFOR scale)	C	Abundance of each species using the SACFOR scale (**S**uperabundant, **A**bundant, **C**ommon, **F**requent, **O**ccasional, **R**are)	Details of scale at: http://www.jncc.gov.uk/default.aspx?page=2684 (e.g. F)
Biomass	O	Biomass of individuals in 1 taxon group	Integer Number units = g. (e.g. 0.23)
Stage development of taxon	O	Development stage of the taxa	Reference Code list STAGE at http://www.ices.dk/datacentre/reco/ (e.g. JU Juvenile)
Photographs and Videos	C	Note if images were taken of specimens at any stage of the processing, the purpose they were collected for, where they are held, what their IDs are and what format the images are in.	Text; (e.g. Images taken of Mytilus edulis were taken to confirm if it was a new subspecies. Images submitted to MEDIN using data guideline on digital images. Images reference numbers are: Mytilus_02mar08_01 to Mytilus_02mar08_68)
Specimens	C	If specimens of the taxa are held then indicate here	Text; (e.g. Examples of all the species within the family Mollusca recorded are stored)
Transcripton	O	If the data has been transcribed from	Text. Y for checked,

Checks		analogue to digital and a proportion of records have been checked for transcription errors then indicate here	
Notes	O	Any further notes that may be of relevance	Text (e.g. The template provided in the MEDIN data guideline was used)