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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	19/07/09	Refinement following comments from Marine Monitoring Group, NMBAQC and other users.

3.0	05/05/2010	Revised in light of new table structure to all guidelines and link to NMBAQC
3.1	15/07/2010	Minor edits following changes to common tables and specification of .csv format for transfer of data

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.

This guideline does not specify methodological standards however where applicable those recommended by the UK National Marine Biological Analytical Quality Control Scheme should be followed. Details can be seen at <http://www.nmbaqcs.org/qa-standards.aspx>

1.3. Using this data guideline

This guideline is split into sections that refer 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 'Sample Event' table respectively and the raw species data is collected in the 'Sample Data' table. The project, survey and fixed station tables in this guideline are 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, conditional or optional as indicated by M, C, or O 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

To submit this data to a Data Archive Centre the data must be saved and transferred in the .csv file format.

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.

2.1. Project Information.

If your collection of data forms part of a wider project or time series then the below details must be recorded.

M, C, O indicate which fields are mandatory, conditional or optional.

Heading	M, C, O	Description	Recommended Term List or Format
Project name	M	The nationally/internationally accepted version of the project name	Free text; (e.g. Rapid Climate Change)
Project website	C	If a Project website exists give the address	e.g. (http://www.noc.soton.ac.uk/rapid/rapid.php)
Project start date	M	The date that the project started	Date; yyyy-mm-dd; (e.g. 2001-01-24)
Project end date	C	The date that the project is due to finish	Date; yyyy-mm-dd; (e.g. 2007-01-24)
Project code	M	Provide a code to uniquely identify the project and allow links to be made between the tables.	Free text; (e.g. RCC)

2.2. Survey Information (Data Activity).

The survey information is a uniquely identifiable programme of data collection such as a research cruise or survey event. This information is likely to be the same for all sample events (e.g. stations) and subsamples in a given data set such as a cruise. Note that in the event that these are not common to all sample events then they should be specified for each one. These fields are common throughout many other MEDIN data guidelines and only need to be given once and referenced if your data set is composed of many data types and therefore conforms to a number of MEDIN Data Guidelines. Where data collection is undertaken on research vessels the data below can often be sourced in the Cruise Summary Report.

M, C, O indicate which fields are mandatory, optional or conditional respectively.

Heading	M, C, O	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
Survey code	M	A unique code for the survey to allow links to be built between this and sample event data (the cruise identifier code could be used)	Free text; (e.g. JCR3022)
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.	Date or DateTime; 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.	Date or DateTime; 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)
Position fix	M	Give the method and source of the position	Free Text; (e.g. Differential GPS taken from

method and source		fix instrument.	the ships navigation equipment.
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 seabed 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	The name of the ship from which the sampling device was deployed.	Term list SHIPC at http://www.ices.dk/datacentre/reco/ (e.g. 74LG Lough Foyle)
Cruise report reference	O	Cruise report reference if applicable.	Free text; in reference format. e.g. Litt, E.J. 2009. PHiXT 4. 30 July to 2 August 2009 <i>RV Prince Madog</i> POL Coastal Observatory Liverpool Bay Cruise Report. POL Coastal Observatory, Liverpool.
Project code	M	State the code of the project given in the project table to allow links to be made between the tables.	Free text; (e.g. RCC)

2.3. Fixed Station Information.

In many cases a fixed point, transect or area is returned to on a number of occasions to form a time series. The actual sample event may not be in exactly the same location each time however due to ship movements or sampling strategy, however it is useful to record both the position which is intended to be sampled (fixed) and the actual sampling position (sample).

Therefore, the information below must be included if a fixed point, transect or area is used as the basis for replicate profiles or for repeat monitoring surveys. Actual profile coordinates should be placed in the sample event table. A fixed station may be a point, transect, or an area. If the fixed station is a transect or an area then the secondary latitude and longitude fields must be completed.

Heading	M, C, O	Description	Recommended Term List or Format
Local station identifier	M	A unique identifier for the station	Free text. e.g. Stanton Bank site 4 (point) e.g. Liverpool/Dublin transect (transect) e.g. Lagan Estuary (area)
Primary Latitude (decimal degrees)	M	The primary latitude of the fixed station given in decimal degrees. For a point this field is set to the point latitude; for a transect it is set to the latitude of the start of the transect; for an area it is set to the southern edge of the box. Units are positive north.	Decimal degrees; minimum of two and a maximum of five decimal places. e.g. 54.5837
Primary Longitude (decimal degrees)	M	The primary longitude of the sample given in decimal degrees. For a point this field is set to the point longitude; for a transect it is set to the longitude of the start of the transect; for an area it is set to the western edge of the box. Units are positive east (West is negative, East is positive).	Decimal degrees; minimum of two and a maximum of five decimal places. e.g. -5.5837
Secondary Latitude (decimal degrees)	C	The secondary latitude of the fixed station given in decimal degrees. For a point this field is not required; for a transect it is set to the latitude of the end of the transect; for an area it is set to the northern edge of the box. Units are positive north.	Decimal degrees; minimum of two and a maximum of five decimal places. e.g. 55.7393

Secondary Longitude (decimal degrees)	C	The secondary longitude of the sample given in decimal degrees. For a point this field is not required; for a transect it is set to the longitude of the end of the transect; for an area it is set to the eastern edge of the box. Units are positive east (West is negative, East is positive).	Decimal degrees; minimum of two and a maximum of five decimal places. e.g. -3.7394
Description of fixed station spatial form	M	Describe if the fixed station is a point, transect or an area.	Term list; <u>SeadataNet Geospatial Feature Type (L021)</u> (e.g. point)

2.4. Grab or Core Information (Sample Event). This table holds information on the location depth and time of each grab or core.

Heading	M, C, O	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)
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 sample (decimal degrees)	M	The longitude of the sample given in decimal degrees. Units are positive east.	Decimal degrees; minimum of two and 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)
Depth of seabed	O		Integer number; units = meters. (e.g. 24)
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,)

Upper depth of sediment sample	O	The upper depth of the sediment which has been sampled. In all cases this will be 0, unless sections have been taken from a sediment core.	Integer number; units = cm. (e.g. 0)
Lower depth of sediment sample	O	The depth to which the device sampled.	Integer number; units = cm. (e.g. 10)
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. Sampling Method (Data Production Tools). If the information in this category is the same for all trawls within a data set the Survey Name must be stated to allow links to the sample information. If the sampling methods 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, C, O	Description	Recommended Term List or Format
Survey name	M	Title of the Survey	Free text; (e.g. Menai Straight Benthic Survey 2004)
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)
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 personnel	O	Names or the personnel who were involved in analysing the samples	Text, personnel initials given and separated by semi-colon if more than one personnel used; (e.g. J. Bloggs analysed all samples).
Sampling analysis	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)

notes			
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)

2.6. 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, C, O	Description	Recommended Term List or Format
Sample identifier	M	A unique identifier for the sample under consideration to allow links to be made to the sample event	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	Text; (e.g. Examples of all the species within the

		indicate here	family Mollusca recorded are stored)
Transcription checks	O	If the data has been transcribed from analogue to digital and a proportion of records have been checked for transcription errors then indicate here	Text. Y for checked,
Notes	O	Any further notes that may be of relevance	Text (e.g. The template provided in the MEDIN data guideline was used)