

# EMODnet Seabed Habitats Data Exchange Format (DEF) for maps of seabed habitats and coastal wetlands

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The purpose of this document is to describe the Data Exchange Format (DEF) that is required in order to publish polygon maps of seabed habitats and coastal wetlands in a standard format via EMODnet.

This guidance supersedes all previous versions, including the original MESH DEFs<sup>1</sup>, upon which these are derived.

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## 1 Rationale for a more flexible, future-proof DEF

Up until 2022, there were three DEFs for seabed habitat maps:

- If the map could not be translated into the EUNIS classification system: **Original Habitat DEF**.
- If the map could be translated into the EUNIS classification system: **Translated Habitat DEF**.
- If the map described Habitats Directive Annex I habitat types: **Habitats Directive DEF**.

Over time, it emerged that it would also be useful to be able to translate into other standard classification systems and vocabularies, including regional classification systems (e.g. HELCOM Underwater Biotopes) and priority lists (e.g. OSPAR threatened and/or declining habitats). Furthermore, the Habitats Directive DEF did not include any 'original habitat assignment' field for cases in which the Habitats Directive Annex I habitat type was a result of a translation.

Looking forward, since 2021 EMODnet has expanded its thematic scope to include coastal wetlands and geographical scope to include European territories in the Caribbean. This further emphasised the need to create a more flexible, future-proof DEF that does not enforce translation to a single classification system (EUNIS).

Specific changes in this version are summarised in **Appendix: summary of changes to the DEF**, with a direct comparison between fields in the old and new DEFs.

## 2 DEF for all seabed habitat and coastal wetlands maps

Table 1 describes the fields that form the DEF for seabed habitat maps and coastal wetland maps in any classification system. A list of the most common classification systems is given in Table 2, with instructions about how to format the text for the attribute table.

Note:

1. Fields are marked as either:
  - a. M – mandatory: the field must be completed for every polygon
  - b. C – conditional: the field is mandatory in certain circumstances, as described in the table

All other fields are optional, but we encourage you to complete as many of them as possible.

2. It is no longer necessary to include fields that contain no information.

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<sup>1</sup> The original version of these Data Exchange Formats were devised in the INTERREG-funded Mapping European Seabed Habitats (MESH) project in 2005.

3. All other non-standard fields (i.e. those not included in Table 1) must be deleted from the attribute table before submission.

Table 1: DEF for seabed habitat and coastal wetland maps. All fields marked "(M)" are mandatory and must be completed for the submission to be accepted. Pay close attention to conditional "(C)" fields, which are mandatory in the circumstances described in the table.

Field name	Data type	Length/Precision	Description
<b>GUI (M)</b>	Text	8	A globally unique identifier (GUI) for the map. Consists of 2 letter country code (which corresponds to ISO3166-1) plus 6 digits. For example, a dataset from the United Kingdom would be written <b>GB000005</b> . This value can be obtained from your country's project partner and should be the same for all features within a habitat map.
<b>POLYGON (M)</b>	Text	10	Permanent identifier unique for each polygon within a dataset (or polygon group in the case of spatially identical polygons reflecting a composite habitat – see Duncan, 2017 <sup>2</sup> ). Can be created as ascending integers 1,2,3... etc. Or a string of text characters and/or integers. This label for each polygon is necessary to identify the original polygon because the FID field may change during the processing of datasets.
<b>ORIG_HAB (C)</b>	Text	255	<b>Mandatory if:</b> <ul style="list-style-type: none"> <li>• <i>ORIG_HAB is not identical to HAB_TYPE</i></li> <li>• <i>HAB_TYPE is empty, because it has not been possible to convert ORIG_HAB to any standard classification system/ vocabulary.</i></li> </ul> Original habitat type assigned to the polygon. This can be either a code or a text description of the habitat. It may be in a standard classification or not. If it is in a standard classification system, then refer to Table 2 for how to format the information, e.g. whether to use a code or a name.
<b>ORIG_CLASS (C)</b>	Text	255	<b>Mandatory if ORIG_HAB is not empty</b> The name of the habitat classification system or vocabulary that defines the term used in ORIG_HAB. If a standard classification system/vocabulary has been used, then refer to Table 2 for how to format the text.
<b>HAB_TYPE (M)</b>	Text	20	Habitat type in one of the standard classification systems/vocabularies included in Table 2. For example, if the classification system is the 2022 version of the EUNIS habitat classification, then HAB_TYPE must be of the form "MA1".
<b>HAB_CLASS (M)</b>	Text	50	Name of the habitat classification system/vocabulary that defines the term used in HAB_TYPE – choose from one of those included in Table 2.  E.g "EUNIS version 2007-11"
<b>HABSUBTYPE</b>	Text	100	This is only relevant for habitat lists where sub-types are defined, such as OSPAR. E.g. where HAB_TYPE = "Intertidal mudflats", HABSUBTYPE may be either "Marine intertidal mudflats" or "Estuarine intertidal mudflats". To find out which classification systems/vocabularies this applies to, see the 'Is HABSUBTYPE relevant for this classification system?' column in Table 2.
<b>DET_MTHD</b>	Text	255	If HAB_TYPE was derived by translation from another classification (ORIG_HAB), enter a short description of the method used to translate the original habitat map. Examples include:

<sup>2</sup> [Duncan, G. 2017. Conforming to EMODnet and INSPIRE feature overlap rules in 'Habitat maps from survey' data submissions. EMODnet Seabed Habitats.](#)

			<ul style="list-style-type: none"> <li>• <b>Manual translation:</b> Each EUNIS habitat within the map was manually determined and entered by an expert.</li> <li>• <b>Correlation table:</b> The translation was performed automatically using known correlations between the original and EUNIS classification systems.</li> </ul>
<b>DET_NAME (M)</b>	Text	255	The name of the organisation or institute who determined the HAB_TYPE.
<b>DET_DATE (M)</b>	Date	-	Date that HAB_TYPE was determined.
<b>TRAN_COM</b>	Text	255	<p>This is only relevant if HAB_TYPE was derived by translation from another classification (ORIG_HAB).</p> <p>Enter any comments on the translation from ORIG_HAB to HAB_TYPE. For example, include brief information from survey reports which justifies the translation decision (especially pertinent if the relationship between the data in the ORIG_HAB field and in the HAB_TYPE field is not clear).</p> <p>Also include reasons for assignment of a particular target habitat type, such as the volume and type of additional data used, and use of expert judgement.</p>
<b>T_RELATE (C)</b>	Text	1	<p><b>Mandatory if HAB_TYPE was derived by translation from another classification (ORIG_HAB).</b></p> <p>Define the relationship between ORIG_HAB and HAB_TYPE. This information is potentially helpful to a user viewing the map, to determine the exact nature of the habitat relationship, especially if the translation is inexact (any symbol other than "=" or "S").</p> <p>The relationship <i>must</i> be described by a one-character symbol chosen from <b>Table 3</b>.</p>
<b>VAL_COMM</b>	Text	255	<p>Record any polygon specific comments resulting from the validation of the map using an independent dataset; for example you may judge that there are spatial errors within the map (sublittoral habitat types appearing in the littoral zone and vice versa).</p> <p>Where possible, all translated maps should be validated with independent additional dataset(s). It is not possible to know whether inconsistencies are due to errors in the validation data, the original map, or the translation process. However, any suspected errors or disagreements between different datasets should be highlighted.</p>
<b>COMP (M)</b>	Text	10	<p>A description of the composition of the habitats (as defined in HAB_TYPE) within polygon groups (see Duncan, 2017<sup>2</sup>).</p> <p><b>If the polygon is not within a polygon group, the value should be '1.0'.</b></p> <p>If the polygon forms part of a polygon group, choose from one of the following options:</p> <ul style="list-style-type: none"> <li>• If the proportion of each habitat within the group is known, enter a decimal value in the "COMP" field for each feature within the group, with values ranging from 0-1 determining the proportion of each habitat. Total value for each polygon group must be 1.</li> <li>• If the proportions are unknown but you know which is the predominant (or primary) habitat, enter the value '<b>primary</b>' for the primary habitat polygon, and '<b>secondary</b>' for all other polygons in the group.</li> <li>• If the composition is unknown, enter the value '<b>unknown</b>' in the "COMP" field.</li> </ul>

<b>COMP_TYPE (M)</b>	Text	20	<p>The type of composition for the habitats within the polygon group (Duncan, 2017<sup>2</sup>).</p> <p><b>If the polygon is not within a polygon group, the value should be ‘single habitat’.</b></p> <p>If the polygon forms part of a polygon group, choose from one of the following options per group:</p> <ul style="list-style-type: none"> <li>• <b>‘heterogeneous’</b>- the habitats contained within the group are both dispersed throughout the described area, but the individual patches have not been delineated.</li> <li>• <b>‘transition’</b> - there is a general trend of change from one habitat to the other(s) across the area. However, the threshold where one habitat changes into another cannot be accurately delineated.</li> <li>• <b>‘data inconclusive’</b> - based on the available survey data, one or more of described habitats may exist within the area, but cannot be confidently attributed. This may, for example, occur where two habitats are not identifiable from the underlying acoustic data on which a habitat map is based.</li> <li>• <b>‘no information’</b> - no information was provided by the habitat creator as to the composition of the habitats within the area. If this option is chosen, the value in “COMP” must be ‘unknown’.</li> </ul>
<b>SUM_CONF (C)</b>	Short integer	-	<p><b>Mandatory if a MESH confidence assessment has been carried out for the habitat map.</b></p> <p>This is the value of the "Total" MESH confidence score given to the polygon or map during the data submission process.</p>
<b>TEXT_CONF</b>	Text	100	<p>A text description of the confidence in the presence and/or extent of the habitat described in HAB_TYPE. This may be a verbose description, or a simple classification of, e.g.:</p> <ul style="list-style-type: none"> <li>• High</li> <li>• Potential</li> </ul>

4. Table 2: List of standard classification systems/vocabularies and how to format the information for the ORIG\_HAB, ORIG\_CLASS, HAB\_TYPE and HAB\_CLASS fields in the DEF for seabed habitat maps and coastal wetlands (
5. All other non-standard fields (i.e. those not included in Table 1) must be deleted from the attribute table before submission.

Table 1). Note that ORIG\_CLASS describes the classification system of ORIG\_HAB and HAB\_CLASS describes the classification system of HAB\_TYPE.

Standard terms for ORIG_CLASS and HAB_CLASS fields	List of accepted habitat/wetland types for ORIG_HAB and HAB_TYPE fields	Accepted format for terms in ORIG_HAB and HAB_TYPE	Is HABSUBTYPE relevant for this classification system?
EUNIS (version 2007-11)	<a href="https://eunis.eea.europa.eu/habitats-code-browser.jsp">https://eunis.eea.europa.eu/habitats-code-browser.jsp</a> We currently accept terms from the <b>Marine habitats</b> section (codes starting with <b>A</b> ) and <b>Coastal habitats</b> section (codes starting with <b>B</b> )	Code only, not including the name e.g. <b>A1.1</b>	No
EUNIS (version 2022)	<a href="https://eunis.eea.europa.eu/habitats-code-browser-revised.jsp">https://eunis.eea.europa.eu/habitats-code-browser-revised.jsp</a> We currently accept terms from the <b>Marine benthic habitats</b> section (codes starting with <b>MA-MG</b> ) and <b>Coastal habitats</b> section (codes starting with <b>N</b> )	Code only, not including the name e.g. <b>MA1</b>	No
Habitats Directive Annex I Habitats	<a href="https://eunis.eea.europa.eu/habitats-annex1-browser.jsp">https://eunis.eea.europa.eu/habitats-annex1-browser.jsp</a> <a href="http://dd.eionet.europa.eu/vocabulary/biodiversity/n2000habitats/">http://dd.eionet.europa.eu/vocabulary/biodiversity/n2000habitats/</a> We currently accept terms from the <b>Coastal and halophytic habitats</b> group (codes starting with 1) and <b>Coastal sand dunes and inland dunes</b> group (codes starting with 2), plus <b>8330 Submerged or partially submerged sea caves</b> .	Code only, not including the name e.g. <b>1110</b>	Yes, although there is no EU-wide standard list of sub-types, so free text is allowed.
Marine Strategy Framework Directive Benthic Broad Habitat Types	<a href="http://dd.eionet.europa.eu/vocabulary/msfd/broadHabitatTypes/view">http://dd.eionet.europa.eu/vocabulary/msfd/broadHabitatTypes/view</a>	Name only e.g. <b>Littoral rock and biogenic reef</b>	No
Ramsar Classification System for Wetland Type	<a href="https://www.cbd.int/doc/meetings/sbstta/sbstta-08/information/sbstta-08-inf-04-en.doc">https://www.cbd.int/doc/meetings/sbstta/sbstta-08/information/sbstta-08-inf-04-en.doc</a> (page 14)	Code and name e.g. <b>F Estuarine waters</b>	No
HELCOM Underwater biotope and habitat classification system (HELCOM HUB)	<a href="https://helcom.fi/baltic-sea-trends/biodiversity/helcom-hub/">https://helcom.fi/baltic-sea-trends/biodiversity/helcom-hub/</a>	Code only, not including the name e.g. <b>AA</b>	No
Classification of Benthic Marine Habitat Types for the Mediterranean Region	<a href="https://www.rac-spa.org/sites/default/files/doc_fsd/habitats_list_en.pdf">https://www.rac-spa.org/sites/default/files/doc_fsd/habitats_list_en.pdf</a>	Code only, not including the name e.g. <b>MA1.5</b>	No

Standard terms for ORIG_CLASS and HAB_CLASS fields	List of accepted habitat/wetland types for ORIG_HAB and HAB_TYPE fields	Accepted format for terms in ORIG_HAB and HAB_TYPE	Is HABSUBTYPE relevant for this classification system?
OSPAR List of Threatened and/or Declining Species and Habitats	<a href="https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats/habitats">https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats/habitats</a>	Name only e.g. <b>Carbonate mounds</b>	Yes <sup>3</sup>
HELCOM lists of threatened and/or declining species and biotopes/habitats in the Baltic Sea area	<a href="http://helcom.fi/Lists/Publications/BSEP113.pdf">http://helcom.fi/Lists/Publications/BSEP113.pdf</a>	Name only e.g. <b>Seagrass beds</b>	No
Marine Habitat Classification for Britain and Ireland v15.03	<a href="https://mhc.jncc.gov.uk">https://mhc.jncc.gov.uk</a>	Code only, not including the name e.g. <b>LR</b>	No

<sup>3</sup> Accepted terms for HABSUBTYPE where HAB\_CLASS = “OSPAR List of Threatened and/or Declining Species and Habitats”:

For HABTYPE = “Intertidal mudflats”:

“**Marine intertidal mudflats**” or “**Estuarine intertidal mudflats**”

For HABTYPE = Sabellaria spinulosa reefs:

“**Sabellaria spinulosa reefs on rock**” or “**Sabellaria spinulosa reefs on mixed (sediment) substrata**”

For HABTYPE = “Kelp forests”:

“**Kelp forests dominated by Alaria esculanta**” or “**Kelp forests dominated by Laminaria digitata**” or “**Kelp forests dominated by Laminaria hyperborea**” or “**Kelp forests dominated by Laminaria ochroleuca**” or “**Kelp forests dominated by Saccharina latissima**” or “**Kelp forests dominated by Saccorhiza polyschides**” or “**Kelp forests dominated by another species**”

For HABTYPE = “Zostera beds”:

“**Zostera marina beds**” or “**Zostera noltii beds**”

If sub-type is unknown, or for all other habitats, leave blank.

Table 3: Translation relationship types, and which codes are accepted for the T\_RELATE field.

T_RELATE symbol	Translation relationship	Example, where HAB_CLASS = "EUNIS version 2007-11"
=	ORIG_HAB is the same as HAB_TYPE.	<b>ORIG_HAB:</b> "Circalittoral rock in a high energy environment" <b>HAB_TYPE:</b> <a href="#">A4.1</a>
~	ORIG_HAB is nearly the same as HAB_TYPE.	<b>ORIG_HAB:</b> "Circalittoral rock in an energetic environment" <b>HAB_TYPE:</b> <a href="#">A4.1</a>
>	HAB_TYPE is contained within ORIG_HAB (i.e. ORIG_HAB has a broader definition).	<b>ORIG_HAB:</b> "Saltmarsh" <b>HAB_TYPE:</b> <a href="#">A2.5</a>
<	ORIG_HAB is contained within HAB_TYPE (i.e. HAB_TYPE has a broader definition).	<b>ORIG_HAB:</b> "High energy circalittoral rock with faunal communities" <b>HAB_TYPE:</b> <a href="#">A4.1</a>
#	The definition of the ORIG_HAB partially overlaps with that of the HAB_TYPE.	<b>ORIG_HAB:</b> " <i>Potamogeton pectinatus</i> community" <b>HAB_TYPE:</b> <a href="#">A5.542</a>
S	ORIG_HAB is the source of the HAB_TYPE.	<i>Similar to "=". Use when the translated EUNIS habitat was created as a result of a successful submission of the original habitat.</i>

Please see the ["Converting maps" section of the archived MESH Mapping Guide](#) for further guidance about how to translate habitat maps, with a focus on translating into the EUNIS classification.

### 3 Study area DEF

A Study Area shapefile should be supplied with each habitat/coastal wetlands map. This should be a rectangular bounding box describing the extent covered by the habitat map. The attribute table should be formatted according to the Study Area DEF.

*Table 4: Study Area data exchange format (DEF). \*If the habitat map does not yet have valid metadata entered on the ICES Geonetwork portal, then your country's partner will upload your metadata and enter the UUID value as required as part of the ingestion process.*

Field name	Data type	Length/ Precision	Description
<b>GUI (M)</b>	Text	8	<p>Unique reference for the study.</p> <p>This must match the GUI of the habitat map to which the study area relates.</p>
<b>UUID (M*)</b>	Text	36	<p>UUID of ICES Geonetwork metadata record in the form of: xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx</p> <p>If the habitat map already has valid metadata on the <a href="#">ICES Geonetwork portal</a> then the "UUID" value should be entered. This value can be found in two ways:</p> <ol style="list-style-type: none"> <li>1. The value after "uuid=" in the URL of the permanent link to the metadata record, for example <a href="#">the UUID of this record is 26f527ac-41f2-4c86-a443-3f655723efdf</a>.</li> <li>2. The value of "File identifier" within the ICES Geonetwork metadata itself.</li> </ol> <p><b>Warning:</b> The UUID must be entered exactly as stated in the metadata and must conform to the pattern xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx (including all dashes) to pass validation.</p>
<b>AVAILABLE (M)</b>	Text	13	<p>Availability of habitat data.</p> <p>The value must be one of the three options:</p> <ul style="list-style-type: none"> <li>• "View/Download" – fully available to the public</li> <li>• "View only" – only available to view on interactive map or by Web Map Service (WMS)</li> <li>• "Not available" – habitat map not available, only metadata and bounding box.</li> </ul>

## 4 Appendix: summary of changes to the DEF

Table 4: comparison of field name in the new DEF and those in the old Original habitat, Translated habitat and Habitats Directive DEFs. Field names are highlighted red where they have changed.

New DEF	Original habitat DEF	Translated habitat DEF	Habitats Directive DEF
GUI (M)	GUI (M)	GUI (M)	GUI (M)
POLYGON (M)	POLYGON (M)	POLYGON (M)	POLYGON (M)
ORIG_HAB (C)	ORIG_HAB (M)	ORIG_HAB (M)	
ORIG_CLASS (C)	ORIG_CLASS	ORIG_CLASS	
HAB_TYPE (M)		HAB_TYPE (M)	ANNEXI (M)
HAB_CLASS (M)		VERSION (M)	
HABSUBTYPE			SUBTYPE
DET_MTHD		DET_MTHD	
DET_NAME (M)		DET_NAME (M)	
DET_DATE (M)		DET_DATE (M)	
TRAN_COM		TRAN_COM	
T_RELATE (C)		T_RELATE (M)	
VAL_COMM		VAL_COMM	
COMP (M)	COMP (M)	COMP (M)	
COMP_TYPE (M)	COMP_TYPE (M)	COMP_TYPE (M)	
SUM_CONF (C)		SUM_CONF (M)	
TEXT_CONF			CONFIDENCE (M)

Apart from the change to field names, the other change is that it is no longer required to include all fields in the attribute table, if some of them contain no information.